INSIDE: 3DS MAX • MAYA • ZBRUSH • RHINO • BLENDER • VUE • SCULPTRIS

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3DArtist

50

Practical inspiration for the 3D community

DESIGN & CREATE EXOSUITS

id Software's Matthew Burke reveals how to concept awesome combat suits using **3ds Max** & **Photoshop**

50 TIPS FOR BETTER CHARACTERS

Explore how the experts bring characters to life and apply their tricks to your own models

MASTER EPIC LANDSCAPES

Discover how Vue 11 can help you build feature-rich terrains

Sculpt for free!

Lay the foundations with our introduction to Sculptris

BUILD THIS MECH FROM CONCEPT TO RENDER

3DS MAX & PHOTOSHOP

Flex your 3D muscles

Take your characters to new heights in Maya

Compositing tips & tricks

Add life to arch-vis renders in Photoshop

Model perfect assets in Rhino

Go polygon-free with NURBS for accurate results

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ISSUE 50

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Artist info

Matthew Burke

3DArtistonline

Username: MBurke

Personal portfolio site
http://mburke.cghub.com

Country USA

Software used
3ds Max, Photoshop

Helping us celebrate issue 50 in style, id Software's Matthew Burke drops in to teach us a thing or two about crafting awesome exosuits in 3ds Max. He then shows us how to bring them to life with post work in Photoshop.

Turn to page 50 to start the exploration of mech design and give yourself the confidence to build and show off your own concepts. Matthew's tutorial is packed with personal tips and tricks and even shows you two helpful techniques to create expert wireframe renders of your favourite models. Enjoy!

Improve your 3ds Max & Photoshop skills

Page 50

“We'll start with the rough-poly concept, move to detailing the model, apply some mental ray shaders, then tackle our lighting. From there I'll be able to walk you through my Photoshop process and, with any luck, we'll end up with a killer concept!”

Matthew Burke reveals his 3ds Max and Photoshop workflow. **Page 50**

Welcome

to the magazine and 116 pages of amazing 3D

Every issue you can count on...

1. **116 pages of creative inspiration**
2. Behind-the-scenes guides to images and fantastic artwork
3. **A CD packed full of creative goodness**
4. Interviews with inspirational artists
5. **Tips for studying 3D or getting work in the industry**
6. The chance to see your art in the mag!

Well, we did it. We turned 50. So as we brush away our grey hairs and smile at the wrinkles of issues past, our special issue 5-0 is a reminder of all that we love about the 3D community.

Celebrate with us as we bring you 50 expert tips for better characters, learn the art of mech design from id Software's Matthew Burke, dabble in Vue landscape-creation with Drea Horvath, discover how Rhino can help your arch-vis creations, explore skin and scales in ZBrush and read our education feature to work out if your career is heading in the right direction.

The free CD is packed with Vue 10 Frontier software and other Vue treats, plus 50 free models, 50 free textures and a host of tutorial files. We can't wait to see what issue 100 will bring!

Lynette

This issue's team of expert artists...

Jahirul Amin

Keeping up the pace, J takes our characters to epic new heights as he teaches us the art of animating a successful jump!

Orestis Bastounis

Orestis gets his geek on as he test-drives the Magnetar M32, reveals what's hot about Kepler and gets busy in Windows 8

Timur 'Taron' Baysal

Introducing Taron, our new sculpting friend here to reveal how we can get awesome results with totally free software

Matthew Burke

When we saw Matt's exosuits on CGHub, we were blown away. Imagine our delight when he agreed to make one just for us!

Michael Burns

When we want the lowdown on what's hot in the industry, we send Michael in. This issue he scopes out the 3D-printing news

Viktor Fretyán

We are so pleased to have Viktor back with us this issue – our arch-vis master drops by to reveal his compositing secrets!

Andrea Horvath

Drea is a veteran when it comes to forging 3D landscapes – this lady knows her stuff! Pick up new tricks from her tutorial

Erland Körner

Unity's very own Erland lends a helping hand this issue to ease our eager minds around animating Rigidbodies in Unity

Matúš Nedecký

When we found Matúš' work on 3DArtistOnline, we couldn't wait for him to show us how he uses Rhino in arch vis

Titouan Olive

Titouan is a genius when it comes to unique characters, so we challenged him with a cliché to see what'd happen!

Filippo Veniero

As if drowning Suzanne wasn't enough (issue 48), this issue our Blender guru sets our monkey friend on fire!

Richard Yot

Our modo expert stops by to check out HDR Light Studio. See how well it works for product visualisation in his in-depth review

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3DArtist

Imagine Publishing Ltd
Richmond House, 33 Richmond Hill
Bournemouth, Dorset BH2 6EZ
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Web: www.imagine-publishing.co.uk
www.3dartistonline.com
www.greatdigitalmags.com

Magazine team

Deputy Editor Lynette Clee
lynette.clee@imagine-publishing.co.uk
☎ 01202 586239
News Editor Chris McMahon
Sub Editor Tim Williamson
Senior Designer Chris Christoforidis
Head of Publishing Aaron Asadi
Head of Design Ross Andrews

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Contributors

Jahirul Amin, Orestis Bastounis, Timur 'Taron' Baysal, Matthew Burke, Michael Burns, Viktor Fretyán, Andrea Horvath, Erland Körner, Matúš Nedecký, Titouan Olive, Dave Scarborough, Filippo Veniero, Poz Watson, Steve Wright and Richard Yot

Advertising

Digital or printed media packs are available on request.
Head of Sales Hang Deretz ☎ 01202 586442
hang.deretz@imagine-publishing.co.uk
Advertising Sales Executive Ryan Ward ☎ 01202 586415
ryan.ward@imagine-publishing.co.uk

Cover disc

Head of Digital Mat Toor
Multimedia Editor Steven Usher
3daxtrahelp@imagine-publishing.co.uk

International

3D Artist is available for licensing. Contact the International department to discuss partnership opportunities.
Head of International Licensing Cathy Blackman
☎ +44 (0) 1202 586401
licensing@imagine-publishing.co.uk

Subscriptions

Head of Subscriptions Lucy Nash
☎ 01202 586443
lucy.nash@imagine-publishing.co.uk
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Circulation

Head of Circulation Darren Pearce ☎ 01202 586200

Production

Production Director Jane Hawkins ☎ 01202 586200

Founders

Group Managing Director Damian Butt
Group Finance & Commercial Director Steven Boyd
Group Creative Director Mark Kendrick

Printing & Distribution

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"Strive for originality. The 3D market is becoming quite saturated now [so] new ideas are hard to come by..."

Andrew Hickinbottom joins our panel of experts to offer his top tips and tricks

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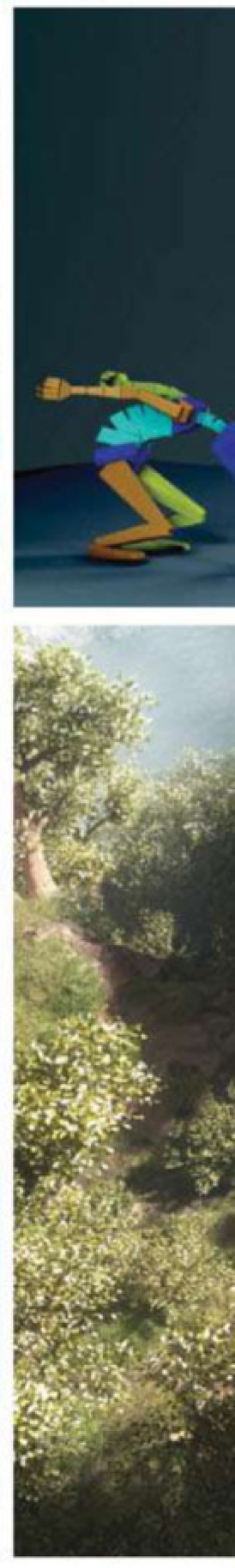

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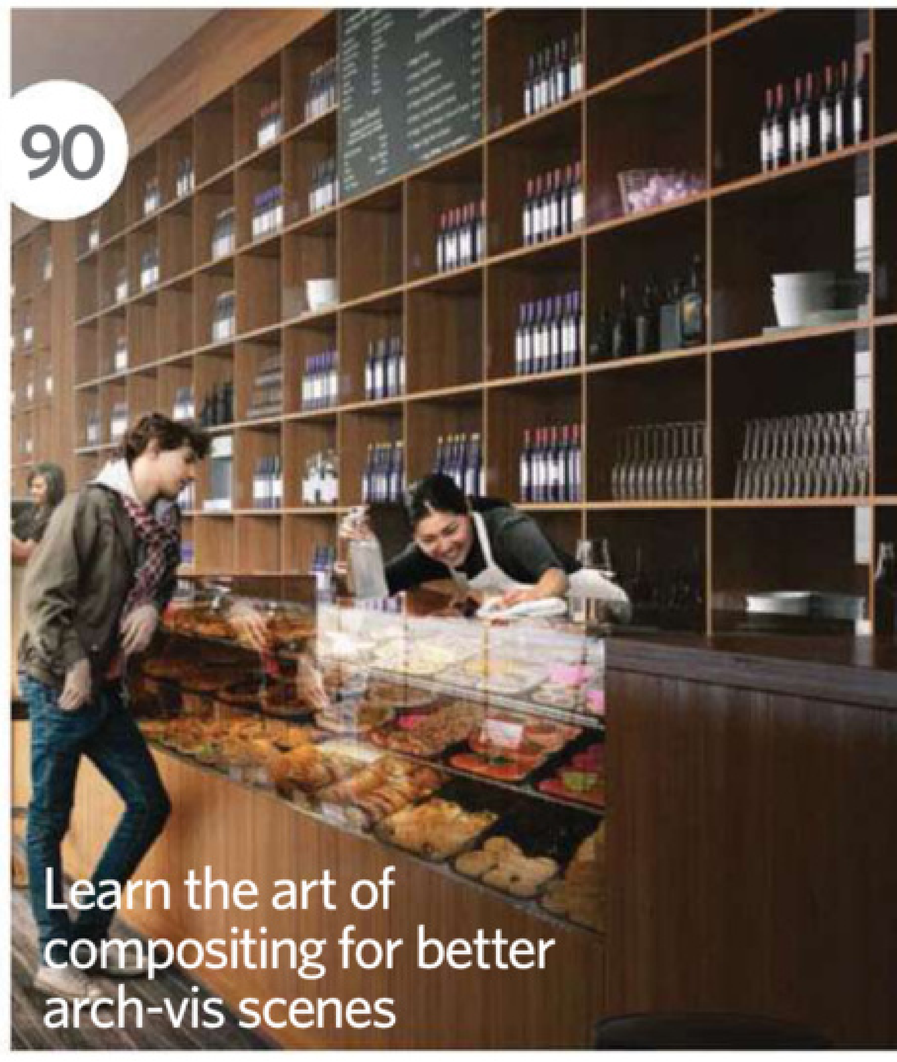

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Learn the art of compositing for better arch-vis scenes

3DArtist is now available on **iPhone & iPad**

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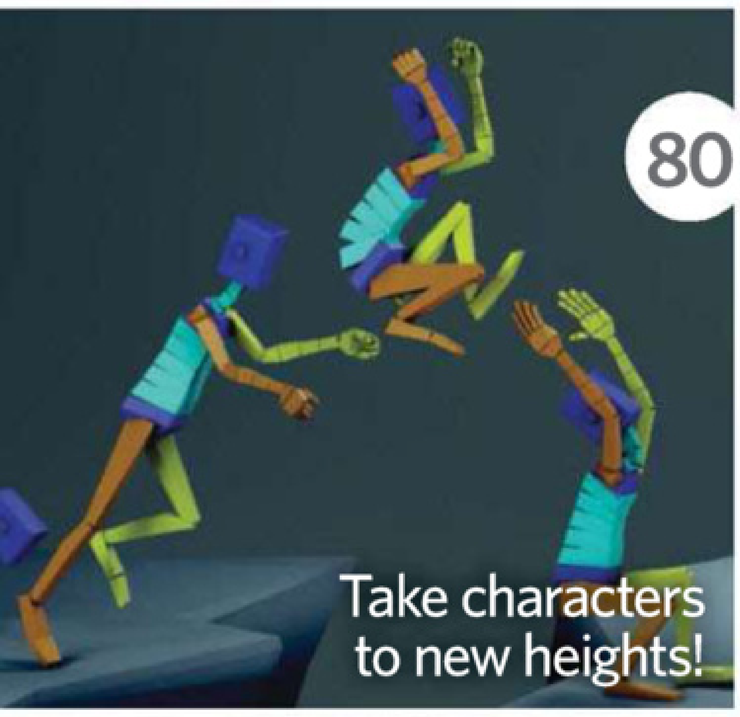
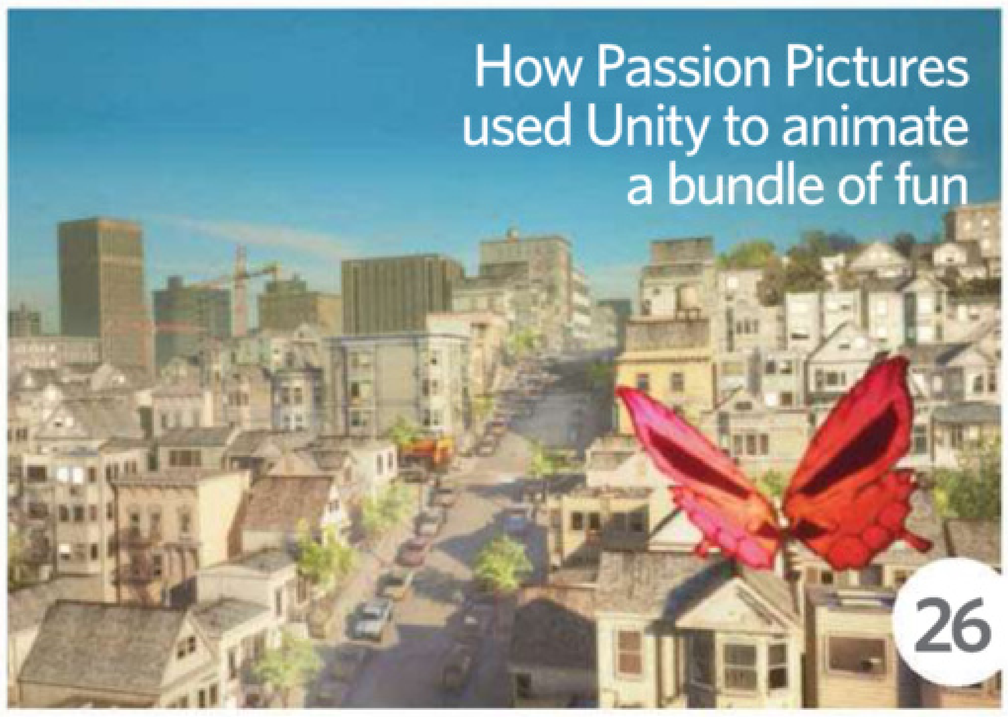
Turn to page 94 for details





The studio

Professional 3D advice, techniques and tutorials

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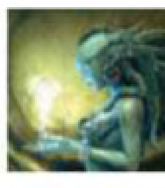
A decade has passed, but this incredible image still holds up!



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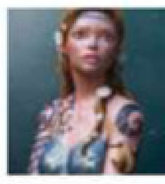

“[We’ll focus] on techniques such as EcoSystem manipulation, atmosphere and lighting settings, render settings, optimisation, material tweaking [–] all of this is important when it comes to building scenes in Vue”
Drea Horvath leads a step-by-step tutorial on landscape-generation in Vue
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WIN!
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CGSociety partners with **3D Artist** to offer over $3,000 US in prizes. Win CGWorkshops, books and CGConnect memberships. Turn to **Page 65** to find out how!

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Expert tuition to improve your skills

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With the Disc

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Turn to page 112 for the complete list of the disc’s contents

WELCOME TO THE GALLERY

Seven pages of great artwork from the 3D community

Images we love!

Artist info

Tomáš Král

Tomáš graduated in 2005 and has been working in the graphics industry ever since

Personal portfolio site
http://tomaskral.cz

Country Czech Republic

Software used ZBrush, NUKE Photoshop, 3D-Coat, Softimage

Work in progress...

"I am proud to present my latest personal work. There's no need to be scared, it's just a harmless dance! Although, I bet the cosmonaut doesn't feel very pleasant"

Tomáš Král, *Space Waltz*, 2012

The team Loves

"What a way to open our Gallery section! This striking image by Tomáš features an incredible composition with dramatic lighting and a strong colour scheme to draw the viewer in perfectly"

Lynette Deputy Editor

storemags.com

Have an image you feel passionate about? Get your artwork featured in these pages

Create your gallery today at **www.3dartistonline.com**

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Artist info

Nathan Boyd

Nathan is a texture painter at Sony Pictures Imageworks and loves films, art and computers

Personal portfolio site
www.nathanboydart.com

Country USA

Software used Maya, MARI, Photoshop, ZBrush

Work in progress...

The team Loves

"The use of 17th Century painting techniques – namely the violent contrast of light and dark – really makes this image stand out, intensifying the threatening feel of the character"

Chris News Editor

"I wanted to make a portrait-style image focusing on the textural detail of the mask. I attempted to maximise the contrast and dramatic effect of the image with Chiaroscuro lighting. Caravaggio's Tenebrism works were a great inspiration and guide"

Nathan Boyd, *Firebomb,* 2012

Artist info

Dennis Kaya Iversholt

Dennis is a 32-year-old 3D generalist working at Cadesign in Aarhus, Denmark

Personal portfolio site http://latter.cgsociety.org

Country Denmark

Software used 3ds Max, V-Ray, Mudbox, Photoshop

Work in progress...

“This is the type of scene I wanted to create for years. My initial idea was to create a present day or futuristic scene, but as I started modelling the character I changed my mind and made this scene, which is inspired by New York in the 50s” **Dennis Kaya Iversholt,** *Neon City*, 2012

Artist info

Lee Griggs

Lee works as a technical author at Solid Angle, producing documentation and tutorials

Personal portfolio site
www.solidangle.com

Country Madrid, Spain

Software used
Maya, ZBrush, Arnold

Work in progress...

The team Loves

"This moonlit-rendered scene has captured an incredible amount of detail to show off that creepy forest floor. The sculpted details of the trees give it a very playful feel and an intriguing sense of scale. It could almost be a scene from a stop-motion set!"

Lynette Deputy Editor

The team Loves

“This image conveys a sumptuous sense of luxury, not just through the objects featured but also in the softness of the textures and the warmth of the lighting. It really sells the royal nature of the scene”
Chris News Editor

“This work is an attempt to touch the reality of kings and their lives through realistic and detailed 3D visualisation. It's true that I'm not a king, but through 3D art I can make that dream come true!” **Walid Layouni,** *I'm The King,* 2012

Artist info

Walid Layouni

3DArtist online
Username: walid layouni

Personal portfolio site
www.straightline-interiors.com

Country Tunisia

Software used
3ds Max, V-Ray, Photoshop

Work in progress...

Artist info

Rudolf Herczog

3DArtist online

Username: Rochr

Personal portfolio site
www.rochr.com

Country Sweden

Software used CINEMA 4D, Maxwell Render, Photoshop

Work in progress...

The team Loves

"Rudy has such a fantastic understanding of lighting – he uses it perfectly to guide the viewer around his scenes. We love the scale of this epic library, cleverly enhanced by his choice of camera placement"

Lynette Deputy Editor

"*The Library* actually started out as a test scene for a new machine. As I've always wanted to create a scene with lots of books in it, I went with 3D models and a few instances rather than using Bump or Displacement maps"

Rudolf Herczog, *The Library*, 2012

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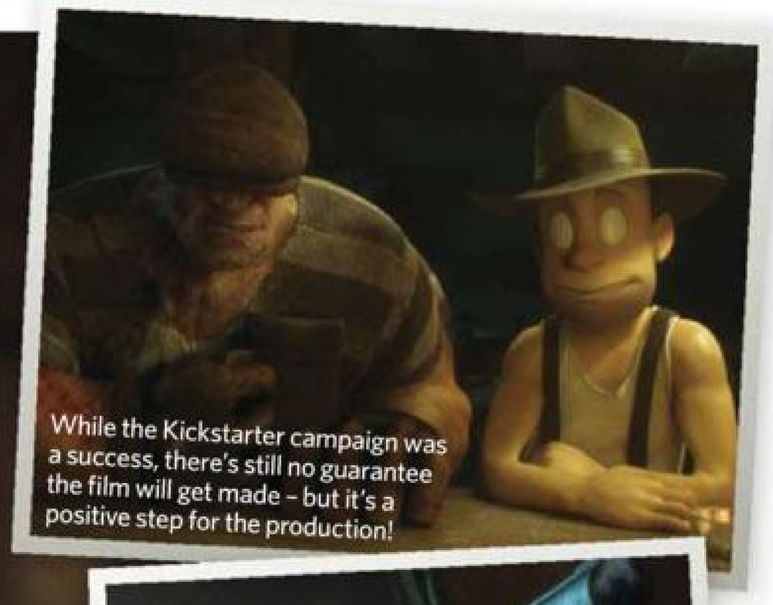
RenPeng Dong

Personal portfolio site
www.oldrhyme.cgsociety.org
Country China
Software used
3ds Max, Maya, ZBrush, Mudbox, Photoshop, V-Ray

"I saw an image on a website that was like a kind of transparent man blending with his background, which brought me this great idea... [I] decided to show the feeling of part drying paint, part real, part plaster"

Non-US readers turn to page 94

Re-creating the unique characters for this 3D animation project was achieved with ZBrush and 3ds Max



While the Kickstarter campaign was a success, there's still no guarantee the film will get made – but it's a positive step for the production!

"It'll look like at least three years have passed," says Jeff Fowler on the finished film, compared to previously released footage. "It'll be noticeable!"

Crowd-funding a Hollywood movie

How Blur Studio and David Fincher took to Kickstarter to help fund The Goon

For the past 17 years, visual-effects house Blur Studio has amassed an impressive portfolio, working on the title sequence for *The Girl with the Dragon Tattoo* plus a multitude of awesome game trailers. But one project the studio has kept close to its heart is *The Goon* – an adaptation of Eric Powell's Dark Horse comic-book series of the same name.

After several years of trying to raise financial backing, the studio and the film's producer David Fincher (director of *Se7en*, *Fight Club* and *The Social Network*) took to the crowd-sourcing website Kickstarter and raised over $400,000 in funding for a story reel (a full-length storyboard) – used to attract investors and Hollywood studios to financially back the production of the movie.

"When we reached our goal, the first thing we did was run naked around the studio screaming and throwing confetti," laughs Blur Studio co-founder Tim Miller. Clearly relieved that the film is a step closer to realisation, Miller has stuck with the project after years struggling with the rigmarole of the Hollywood pitching system. "Hollywood has a long history of films that were not well received because they were outside of the box the first time they were presented," explains Miller. "We had figured up until the Kickstarter project that our film was just going to be like that."

Indeed, *The Goon* isn't your typical animated adventure. The eponymous Goon is a hulk-like brute who fights supernatural forces with his pupil-less midget companion, Franky. For Blur it was an atypical animated movie that perfectly aligned with the studio's sensibilities. "We have a really nice mix of both stylised keyframe and more traditional animation, as well as the hardcore, gritty, action stuff," says Miller. "If you compare it to a film like *The Incredibles* or *Tangled*, they have a certain sweetness to the stylisation of the characters. *The Goon* is going to be stylised, for sure, but it's got this whole level of grittiness and almost an ugliness to the design that makes it unique – and when I say ugliness, I mean it in an interesting way. The characters aren't pretty; they're dirty, gnarly, old, wrinkled, scarred and f*****d up. You just don't see that in your typical Disney film."

Blur views *The Goon* as a unique animated feature, with dark comedy and inventive action

Read our full interview at **http://tinyurl.com/3da-thegoon**.

> "We have a really nice mix of both stylised keyframe and more traditional animation, as well as the hardcore, gritty, action stuff"
> **Tim Miller** Blur Studio

Negative press

Blur Studio responds to the confusion over the Kickstarter campaign

While Blur Studios firmly stated that *The Goon* Kickstarter project was launched to raise money for a story reel, it inevitably attracted a negative response from certain pockets of the community. Some confused it as a fundraiser for the feature film, while others criticised the amount of money required for a story reel. "We wanted there to be no confusion about it, but it was inevitable," says Blur Studio's Jeff Fowler. "A lot of people think $400,000 is a lot of money to make a story reel, which is, of course, certainly not realistic. Any of these Disney/Pixar films spend over $100 million on a film; the money they spend on a story reel is certainly going to be several million dollars. So a $400,000 story reel is a steal in terms of budget."

The many faces behind The Goon

David Fincher, producer and A-list Hollywood director
Fincher has tried to get multiple projects off the ground at Blur Studio before *The Goon*. "We were pitching a *Heavy Metal* film for a while," remembers Blur's Tim Miller. "I remember when I showed it to David he was like 'Holy s**t, *Heavy Metal*, that's awesome! I can set that film up in two weeks!' Three years later we're on meeting 126 and we still haven't done it."

Paul Giamatti, voice of Franky
Star of *Sideways* and *Cinderella Man*, character actor Giamatti has been attached to voice *The Goon*'s runtish right-hand man, Franky, since the studio began working on test footage in 2010. Thanks to the Kickstarter success, he'll be back in the recording studio to lend his vocals to the story reel.

Eric Powell, creator The mastermind behind the original *The Goon* comic series, Eric Powell penned the screenplay and has been a staunch supporter of Blur since it started the project in 2008.

Actor Paul Giamatti recorded voice work for *The Goon*'s test demo back in 2010

Artist spotlight

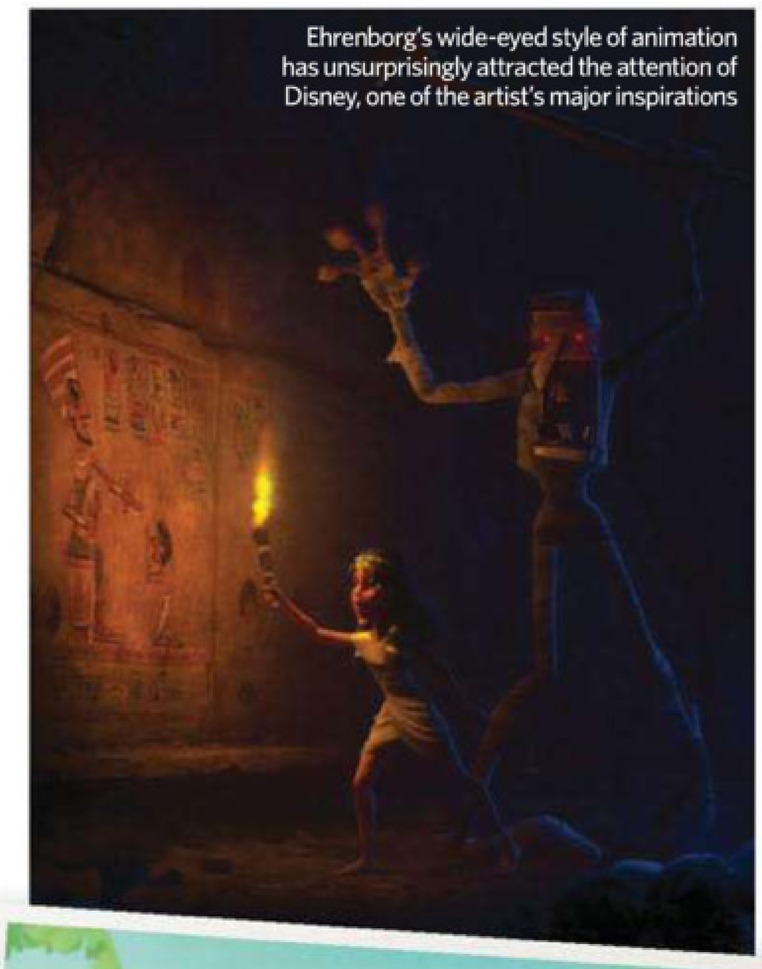
Cartoon creations

Anders Ehrenborg discusses how his two-man start-up business achieved worldwide success

Anders Ehrenborg www.fellah.net

Digital Banana co-founder Anders Ehrenborg spent several years as a freelance artist before setting up his own creative agency. "It started as a freelance collaboration between me and John Banana, but things went better than we thought," says Ehrenborg. "One client led us to another, and it didn't take long until we had big clients under our belt. A few years later we had enough work to open our first office in Paris."

Digital Banana specialises in commercials, music videos and film work, with previous clients including Disney, EA, Robbie Williams and Justin Bieber. Nowadays, the business side is handled by Banana, while Ehrenborg oversees the art. "I've been developing my cartoon style more than anything else," says Ehrenborg, who still finds himself experimenting with techniques in his spare time. "When I make personal works I like to create semi-realistic things to challenge myself. I adore Scandinavian troll-like creatures, such as the ones from John Bauer. Although I have several ones on my hard drive, I'm not satisfied with any yet, so I'll keep them for myself a while longer."



Ehrenborg's wide-eyed style of animation has unsurprisingly attracted the attention of Disney, one of the artist's major inspirations

Nowadays, Ehrenborg is based in New Zealand where he lives with his girlfriend, who works for Weta

"I wanted to create my own spin on the idea of the centaur," says Lavin

Lavin studied animation at Bournemouth University before working for various production companies

How to create lifelike animals

When it comes down to crafting animals, Lavin begins by immersing himself in the wild. "I love nature documentaries and visiting zoos and safari parks any chance I get," he says. "First and foremost, study anatomy as much as you can. I think it's really important to study human anatomy and compare how different creatures have evolved from what is essentially the same template."

3D Sketchbook

Animal instincts

3D artist Ed Lavin discusses the gradual evolution of his Liontaur sculpture

Ed Lavin

Ed Lavin cites precise anatomical accuracy as being pivotal to the success of his unique Liontaur sculpture. "I like to paint in as much anatomical detail as possible and treat it as a learning exercise," explains Lavin. "I will layer up the muscles one by one and, even though some of this fine detail will be lost in the finished piece, I think this process gives a better understanding of the model as a whole."

Lavin's Liontaur model is not short on striking detail, the artist beginning his sculpture at the body using a combination of Maya and ZBrush before using ZBrush's clay, standard and move brushes to add definition. "I wanted to create a scene where the Liontaur is out on a hunt with his lion companions like a hunter with his hounds. I have tried to create a tribal feel like he's part of a race of warrior hunters."

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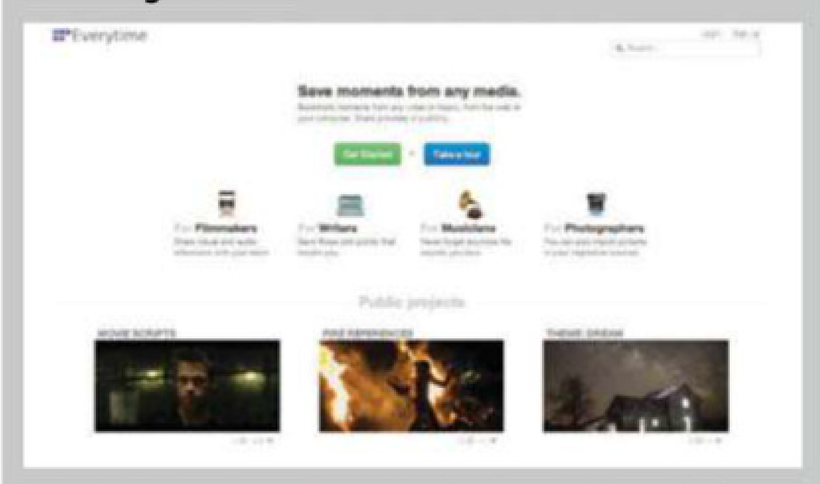

Created by Framestore and Weta Digital FX guru Guillaume Fradin, Everytime is an innovative reference-sharing website that enables users to collate and organise material to share with other artists online. Gathering web media from YouTube and Soundcloud, along with the option to upload personal files, users can compile playlists to be shared, create comprehensive showreels or publish software tutorials. "Everytime can be very useful to 3D artists by helping them gather references for their current or future projects," says Fradin. "Those references can be any moments from any web media, like YouTube or Vimeo, but also any files on a computer. 3D artists can also use Everytime to watch or publish tutorials with chapters, or even create showreels."

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inspiration corner

'Full House'

While some like to rigorously plan their artwork, others prefer a more spontaneous approach. Gavin is an advocate of the latter...

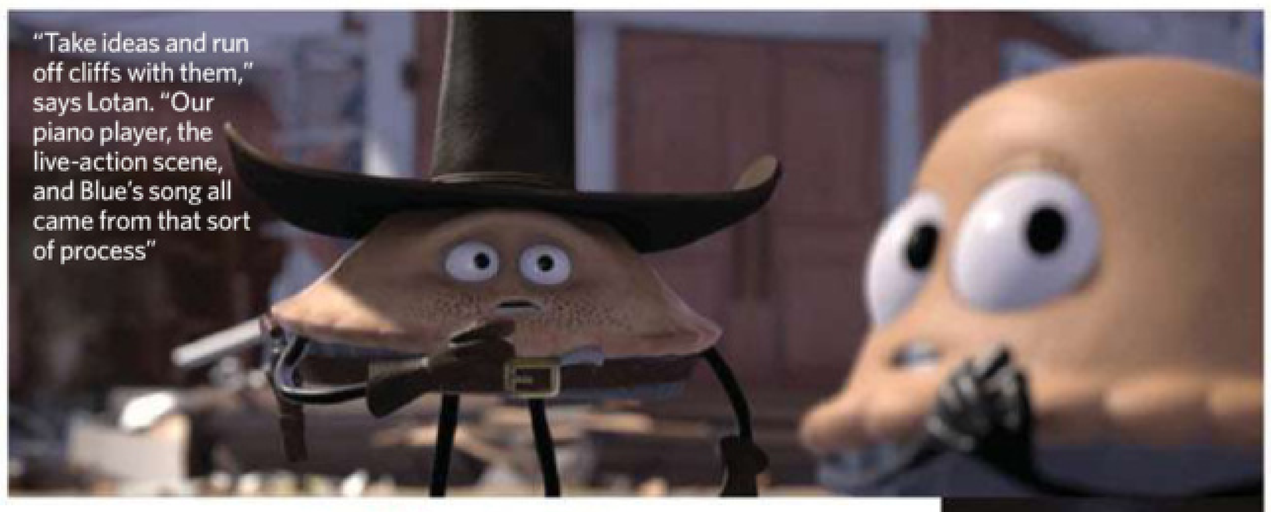
Gavin McGinty http://visualworks.wix.com/gmg2

Taking an atypical approach to his artistry, Gavin McGinty prefers to iterate and refine design ideas until he discovers the right vivid concept. "[It's] terrible advice to give anyone, I know, but I think some of my best work organically develops itself without need for restricted planning," he explains.

McGinty's latest piece, *Full House* – a vision of a rain-soaked house designed using 3ds Max, V-Ray and Photoshop – was a project the artist started a couple of years ago, which he only recently completed. "The initial concept of how I imagined this visual would turn out changed day by day, hour by hour with trial and error," explains McGinty. "I got to the point where I thought 'Okay, I'm starting to see something I like here.' At that point I had a clear image of where I was going and what I wanted regarding the modelling.

"I think that's the beauty of personal work," he adds. "Nobody needs to tell you what's right or wrong."

McGinty's latest work marks the culmination of two years' work


"Take ideas and run off cliffs with them," says Lotan. "Our piano player, the live-action scene, and Blue's song all came from that sort of process"

behind the scenes

Comedy through CG

Uri Lotan discusses his pie-filled Western comedy

Uri Lotan http://urilotan.blogspot.co.uk

***The Ballad of Poisonberry Pete* isn't your typical student project, but the premise of a crust-based cowboy in a desert-orientated comedy was an idea that Computer Animation students Uri Lotan, Adam Campbell and Elizabeth McMahill couldn't resist.** "The film began in our junior year in a late night brainstorming session filled with puns and silly drawings," says Uri Lotan. "We took a break over the summer while the three of us went off to work at internships and began production when we got back to start our senior year."

While Maya, RenderMan, NUKE, Premiere and Photoshop were used to construct the comedy set pieces, Lotan states that the humour starts with a deep understanding of characters. "It's important to have strong and appealing characters," he says. "Knowing your characters, story goals and film aesthetic is essential and will inform a lot of your design and acting choices."

Between semesters at college, Lotan worked as an intern at Walt Disney Animation Studios

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Softkill Design spins a house from powder

Beautiful and fascinating, the ProtoHouse proves that 3D printing can be used for something far beyond the odd iPhone case or printed vase. Created by London-based architects Softkill Design (www.softkilldesign.com), this prototype for a 3D-printed house investigates the architectural potential of selective laser sintering.

With the support of Materialise (www.materialise.be), Softkill's Nicholette Chan, Gilles Retsin, Aaron Silver and Sophia Tang produced a high-resolution model at 1:33 scale using computer algorithms that micro-organise the printed material itself. ProtoHouse consists of 30 detailed fibrous pieces that can be assembled into one continuous cantilevering structure without the need for any adhesive material. The technique offers flexible textures and the ability to produce in-built architectural elements, such as structure, furniture, stairs and façade – all in one instance.

A life-scale version is in development, aiming to prove the case for lightweight, optimised, pre-printed structures that can be transported to building sites for assembly.

Image by Julia Kubisty of a high-resolution model of the ProtoHouse by Softkill Design

Autodesk offers 3D-printing tool

123D Design is a free 3D-modelling tool from Autodesk

123D Design enables you to assemble models from kits or build your own based on 3D primitives

Part of the 123D family and running on iPad, Mac, PC or web browsers, it offers a low-cost route to modelling for 3D printing. Using a simplified 3D interface, 123D Design enables users to build a digital model from scratch, grouping and snapping together pieces and sculpting them with standard 3D tools. Users are then able to export the model as an STL file for an onsite 3D printer or fabricate it via online 3D-printing partners Sculpteo, i.materialise and Shapeways.

The software provides base shapes and example models to inspire users and to get them designing quickly. 123D Design also includes pre-set kits, such as robots, a train and a house, with more kits available online from the 123D website (www.123dapp.com).

The Form 1 is a new entrant in the relatively low-cost end of the 3D printer market

Form 1, the new low-cost printer

After a successful crowd-funded launch on Kickstarter, Formlabs announces pre-orders

Formlabs, founded by designers and engineers from MIT Media Lab in 2011, is now accepting pre-orders for its newly completed high-resolution 3D printer, with a price pegged at $3,299 US. Form 1 uses stereolithography (SL) technology to achieve a minimum feature size of 300 microns. The printer forms cross-sections driven by precise laser movements and creates layers as thin as 25 microns in a build volume of 125 x 125 x 165mm. Form software, custom-formulated printing materials and Form Finish post-processing kit complement the printer, which can be ordered at http://formlabs.com.

Objet set for school run

Educational establishments can now get an all-inclusive 3D-printing package

It's based around the Objet30 Scholar, a desktop 3D printer capable of 28-micron-layer accuracy, smooth surfaces, fine details and moving parts. The Objet30 Scholar Package includes a two- or three-year supply of rigid-blue opaque 3D-printing materials that Objet will store and deliver on demand. Particularly aimed at STEM curriculum studies, the package also includes a desktop Water-Jet system to remove the support material, training for users, maintenance of the 3D printer, plus technical support. Find more info at http://objet.com/industries/education.

The Objet30 Scholar 3D Printer produces models with smooth surfaces, fine details and moving parts

Reveal Your Powers

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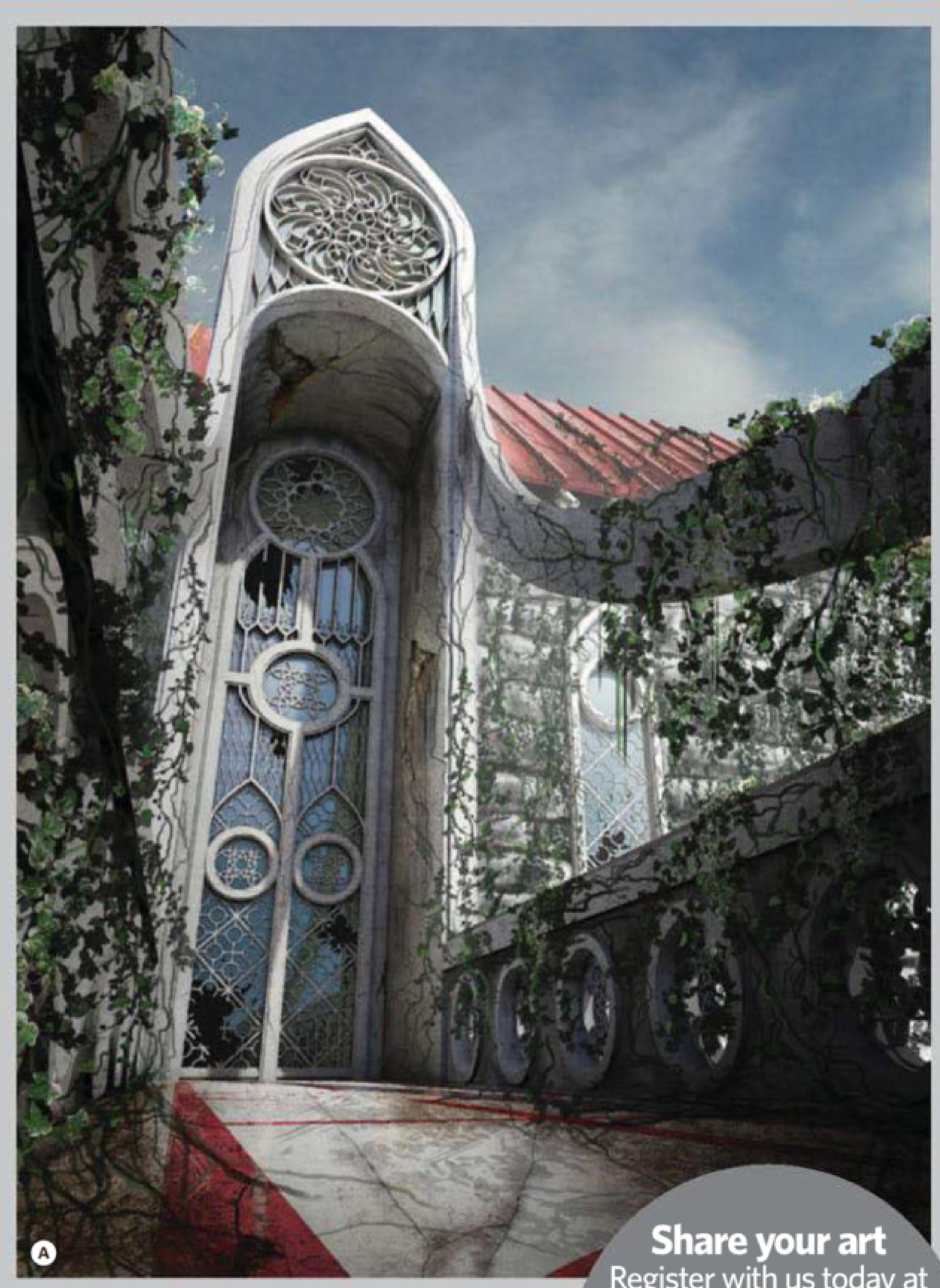
A

Pictures of the week

THESE ARE THE IMAGES THAT WERE AWARDED PICTURE OF THE WEEK IN THE LAST MONTH

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www.3dartistonline.com
to view the art and chat to the artists

A Forgotten Church
» **Gurmukh Bhasin**
3DA username Gurmukh
Gurmukh says: "Once a beautiful church now lost and forgotten. Made with the help of Rhino, Maya, ZBrush, mental ray and Photoshop"
We say: This image has been very thoughtfully composed with a low-angle shot to add height and grandeur to an abandoned church. We'd love to go exploring in this mighty building!

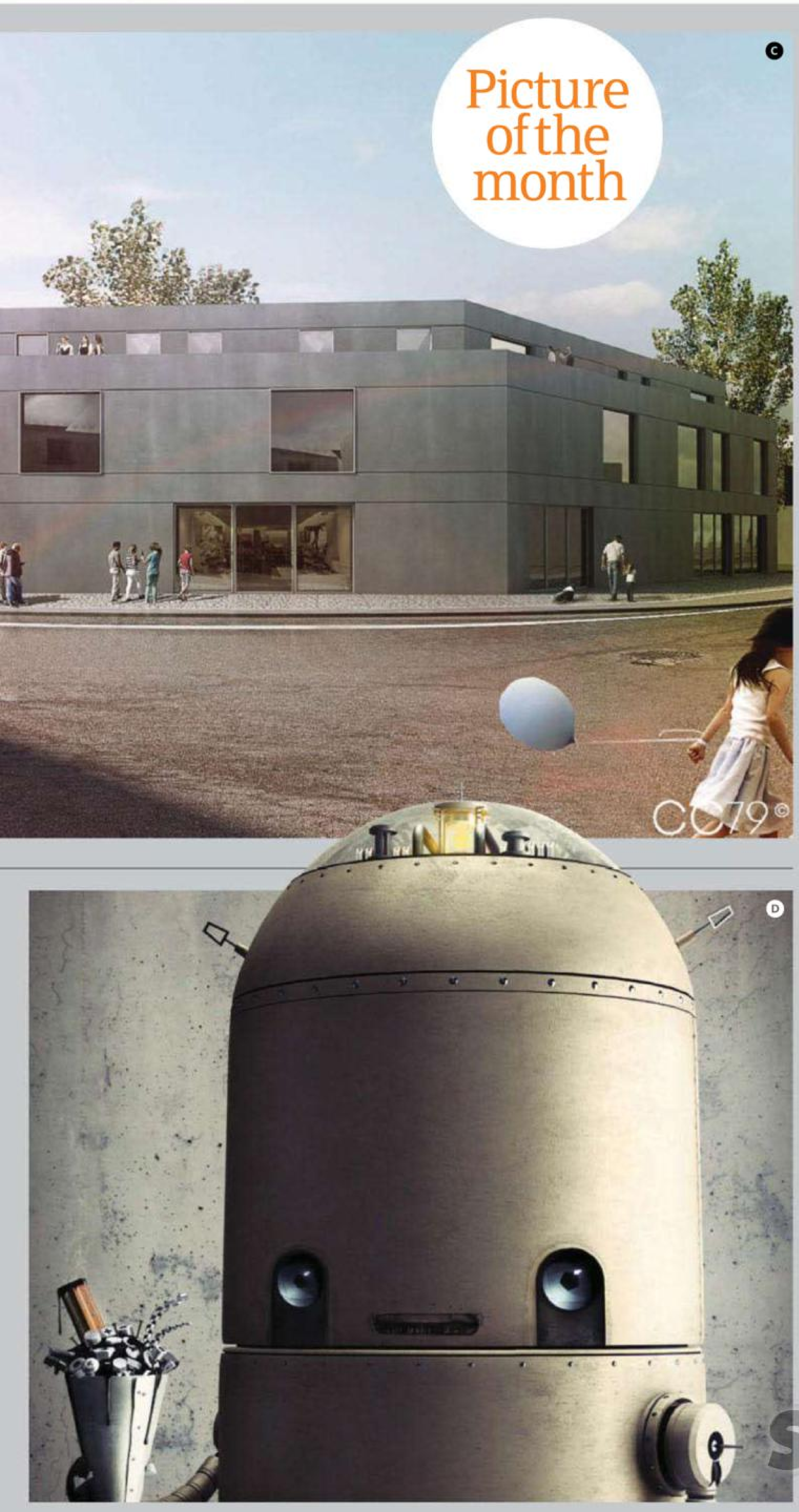
B Pactor, the negotiator
» **David Munoz Velazquez**
3DA username munozvelazquez
David says: "*Pactor, the negotiator* is a character design made directly in 3D. I wanted to achieve a cold-blooded character that's a bit scary. It was made in ZBrush for modelling and rendering and Photoshop for compositing and retouching"
We say: Well, this is just frightening. The eyes are so powerful they'll send shivers down your spine. David's work has a great style and finish that helps to give his characters an edge

C Housing
» **Cristian Chierici**
3DA username ccsettantanove
Cristian says: "Architectural visualisation for Plan 11 Studio. Made with Rhino, V-Ray and Photoshop. Thanks to Fede Fernandez for the precious help!"
We say: Cristian is becoming a Readers' Gallery celebrity with all his stunning renders. The Photoshop touches to this one really add a unique finish that makes his arch-vis stand out from the crowd

D Strange Behaviour
» **Riccardo Zema**
3DA username kidqube
Riccardo says: "The concept behind this image was to give a human touch to a robot – not with resemblance but in behaviour – so I thought about a child that dirties himself with ice-cream and re-created it in a [more] robotic way"
We say: We love how happy this little guy is to be treated to a nut-and-bolt ice cream. His eyes have been treated perfectly to give expression and life to this all-metal face. Great work!

B

Picture of the month



Miria

» Clelio Rossi

3DA username Wybie

Clelio says: "For the modelling of *Miria* I used ZBrush for the basic shapes. The design of the suit in Maya was the thing that took me longer because I had no references and I had to use a bit of imagination"

We say: While *Miria* might look like she's wrapped in tyres, we salute Clelio's dedication to the character's outfit, and for capturing such a fierce stare with those eyes

Mccollum Loft

» Matheus Passos

3DA username mpassos

Matheus says: "This was a personal work inspired by Leone Design Studio. It was a study in an environment with different lighting; sometimes IES, sometimes VRayLight, Day and Night. I hope you enjoy!"

We say: Another exceptional render from Matheus' portfolio – we particularly love the careful attention to materials and reflections in this one. The glimpse at the city through the window is also a great trick!

Iron Minotauros

» Hoo Lee

3DA username zetfree

Hoo says: "This was a personal project to create a hard-surface model. I wanted to make *Minotauros* as a mechanical version. Created using 3ds Max 2012, ZBrush 4 and V-Ray"

We say: Robots really do rule. We are particularly impressed by the pose Hoo Lee has captured with this character – mechanical bots and suits are often very rigid, but this one is ready to pounce!

Family Saloon

» Paul McMahon

3DA username paulychops

Paul says: "Work in progress of a 'toon model car. Modelled in CINEMA 4D and rendered with V-Ray for C4D. No particular reason for the angular background, I just got tired of using boring studio setups"

We say: We love the exceptionally tiny wheels and the scattered rocks. You can easily imagine this shot as part of a cartoon sequence

Stockfreaks.com

Get in touch...
3dartist@imagine-publishing.co.uk

Have your say

Email, Tweet or get in touch with us on Facebook to share your thoughts, opinions and proudest projects

You tell us

Facebook.com/3DArtistMagazine

We've got our headphones on to pump out some songs while reading through our excellent upcoming tutorials – what tunes are you all listening to today?

Les Taylor: The new Deftones album

Kevin Boulton: Alex Clare on for me with a bit of *Above and Beyond* Podcast. Productivity on high

John Lydon: FEED ME - *Love Is All I Got*

Jorge Sánchez: Seether - *Karma and Effect*

John Lum: David Guetta!

Get involved... @3DArtist

What's on your 'to learn' list for next year? Let us know and we might be able to help you tick off those New Year's resolutions!

@SSACreative Anything and everything CINEMA 4D. I've been slow to get into it, so any projects or tutorials are quite welcome

@lucagiuglietti Hey! I'd like to learn how to create good animations without a huge computational power! I have a MacBook Pro 13" and I must save it!
@3DArtist @lucagiuglietti Hi Luca, any software prefs?
@lucagiuglietti Oh yeah! I use Blender so I'd like one or more tutorials about it and about saving computational power with it

@StopMotionMan Hmm, for me learning more about compositing, Vue environment creation and maybe even try my hand at a bit of 3D model making!

digital-tutors
www.digital-tutors.com is a learning resource site boasting a library of 17,000 video-based CG lessons

Star letter

THE AUTHOR OF THIS ISSUE'S STAR LETTER WINS A MONTH'S FREE SUBSCRIPTION TO DIGITAL-TUTORS WORTH $45

Start 'em young

Hello, my name is Alan and I am 14 years old. I just started my 3D modelling class and tried to model a 3D alien head – and this is what I made. I always read your magazines – I LOVE them – and I love 3D modelling and creating 3D art. I was wondering if you might like to put some of my art on your website or maybe even in your magazine? Here is my first 3D model – it's not finished yet.

Thanks, your avid reader and fan,

Alan, by email

If this is Alan's first 3D model, we can't wait to see what he's creating in a decade!

Oh Alan, you really know how to pull at our heartstrings! It's absolutely fantastic to see artists (and readers) getting hooked on 3D at such a young age. For being so awesome, we have awarded you the Star Letter prize this issue, which means you get a whole month's worth of free access to the mighty Digital-Tutors website, where you'll find tons of learning materials to help you with your studies. We ask only one small favour in return: will you promise to show us what you've made in a month's time? Best of luck for the future and happy modelling!

I'm baaaack!

Hello everyone! After some time without doing any arch-vis projects, here I leave my latest personal work. Hope you all like it!

Tiago Alexandrino, via Facebook

*Thanks for sharing your work on our Facebook Page, Tiago! Be sure to also create/update your free **3D Artist** reader's gallery on 3DArtistOnline, too, for your chance to be picked as an Image of the Week and featured in the magazine.*

What about the CD?

If I purchase a digital version, do I still get to access the CDs through download?

Justin, via Facebook

*Hi Justin, digital readers don't get the full CD content, but all the tutorial files from every issue are hosted on our website right here: **www.3dartistonline.com/news/tutorial-files**.*

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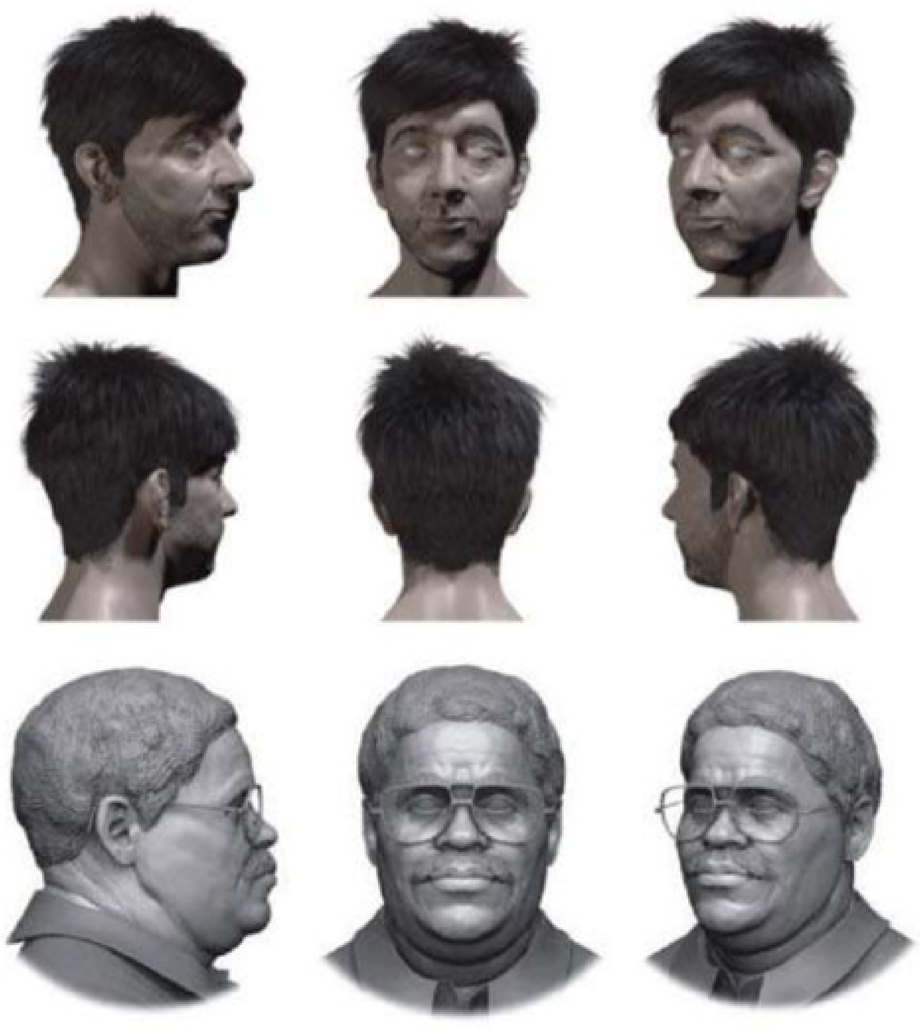
ANIMATING

Passion Pictures and Unity Technologies reveal how they teamed up to create a window-smashing, wall-bursting, havoc-wreaking, real-time animation in the Unity engine

Words: **Chris McMahon**



Unity is fast becoming one of the most dominant engines in game development today. Its uptake has risen alongside the growth in the mobile and social games market with a hoard of Unity-created games now available. It's grown so big, in fact, that even company CEO David Helgason claims to have lost track of exactly how many there are.

However, despite its success, Unity isn't yet considered on a par with the likes of Unreal, id Tech 5 or CryEngine due to its lower level of graphical fidelity. If the engine is to survive in the ever-evolving world of videogame technology, it needs to prove it can hold its own against the big guns. And that's where 'The Butterfly Effect' comes in.

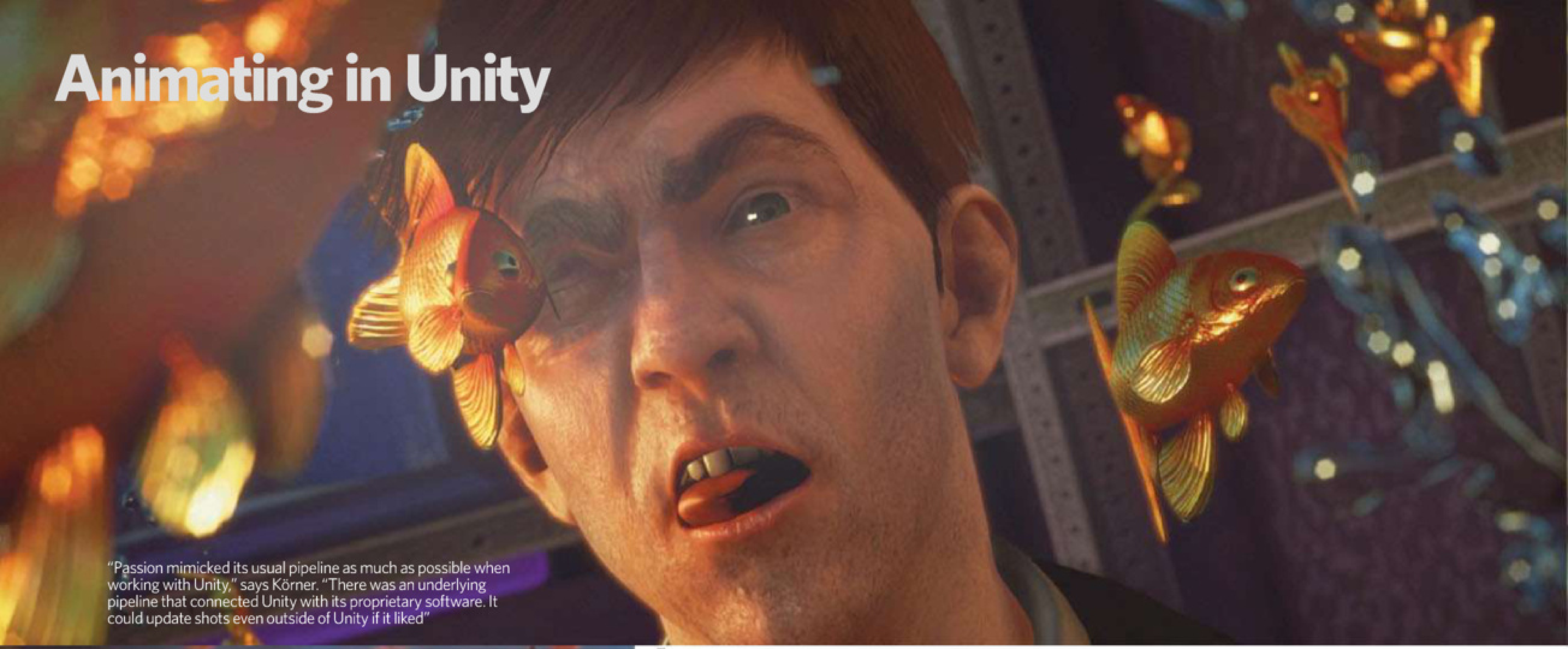
Created as a collaborative project between the technical development team at Unity and London-based CG vendor Passion Pictures – plus some key input from NVIDIA – 'The Butterfly Effect' pushes Unity to the next level. The project employed techniques and workflows used in current-day Hollywood blockbusters to create an impressive real-time short.

The collaboration was beneficial to all – Passion Pictures got to create a superlative-looking animation, while Unity got to learn what technology and optimisations the engine required to make this goal a reality. It's been this symbiotic relationship between creative and technical 3D – between art and maths – that's made 'The Butterfly Effect' possible. This combination has transformed Unity into a better tool for CG artists.

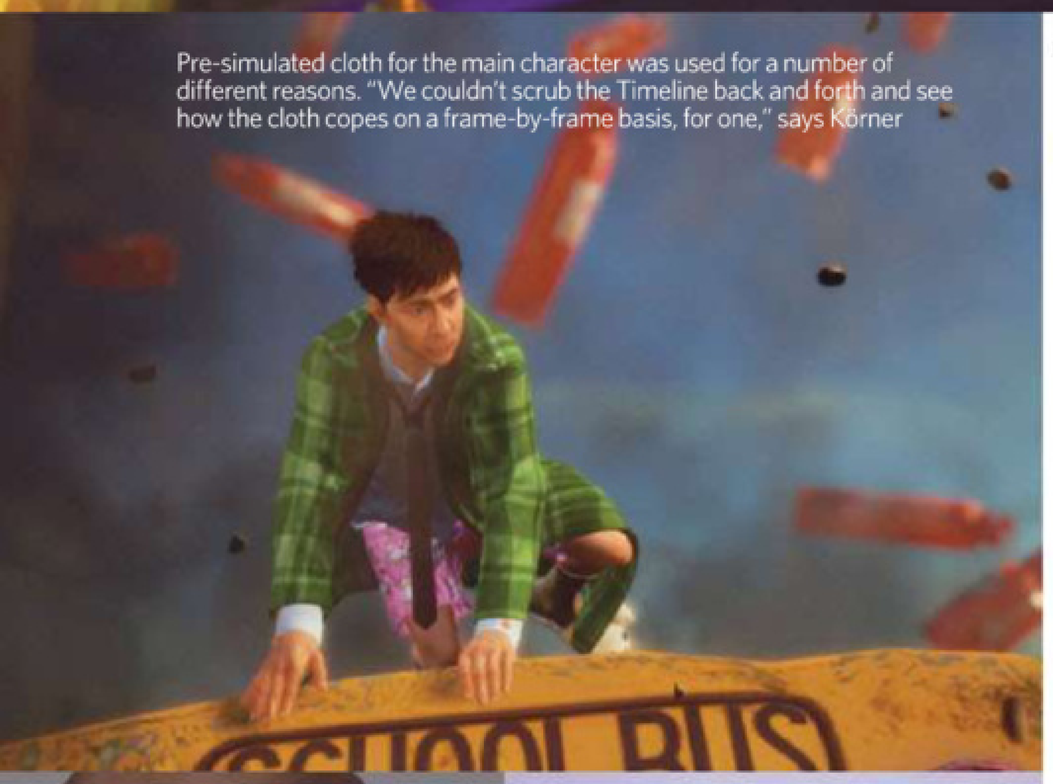
"We collaborated very closely with all of our partners in this," says Erland Körner, technical artist at Unity. "Passion wanted something that looked very much as close to an offline-rendered movie as possible, while we tried to show off the technology behind it. The end result, however – and always the most important – was just making a really compelling movie..."

IN UNITY

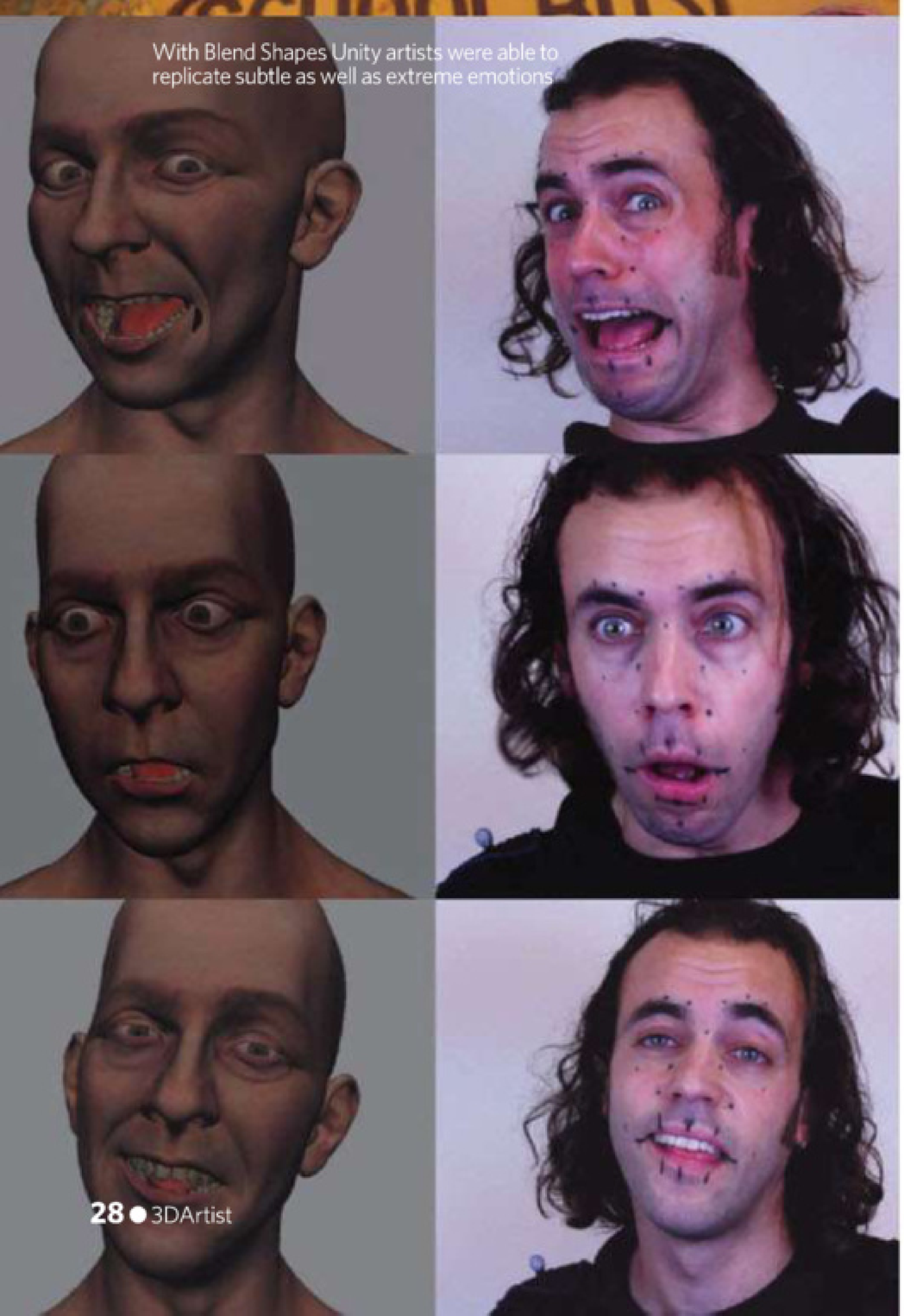
See 'The Butterfly Effect' & more at http://unity3d.com/promo/butterfly



"Passion mimicked its usual pipeline as much as possible when working with Unity," says Körner. "There was an underlying pipeline that connected Unity with its proprietary software. It could update shots even outside of Unity if it liked"



Pre-simulated cloth for the main character was used for a number of different reasons. "We couldn't scrub the Timeline back and forth and see how the cloth copes on a frame-by-frame basis, for one," says Körner



With Blend Shapes Unity artists were able to replicate subtle as well as extreme emotions

ANIMATING IN UNITY

The focus of 'The Butterfly Effect' is on physical comedy, meaning the animation is an integral part in ensuring its success. Given that the new animation features of Unity 4.0 were not available at the time of creation, Unity was largely left out of the animation process. The team at Passion Pictures instead turned to motion-capture providers Centroid and Cubic Motion.

"At the point we started the project we weren't at a state where Mecanim (Unity 4.0's new animation retargeting system) was fully available, so most of the character animations were created outside of Unity," explains Körner. "A professional actor performed most of the animations, which were then transferred to the skeleton setup in Softimage..."

What Unity brought to the project with regards to animation was Blend Shapes support, which enabled the team to create some truly extreme facial expressions. "The hero doesn't speak at all in the piece, but he still has a lot of facial expressions," says Körner. "They're very extreme in many cases because we wanted to show the system's ability to do more than just the stereotypical real-time expressions. We have him displaying confusion and disappointment, and all these more subtle kinds of expressions."

The expressivity of Blend Shapes wasn't just used to deform facial animations. "Blend Shapes are a useful way of having very expressive faces, but they're also useful for other things, such as the cloth of the protagonist's robe," says Renaldas Zioma, senior developer at Unity. "From a tech standpoint it's basically the same. You can attach the animations that will drive how many of the certain Blend Shapes to mix."

The cloth in the film was not actually simulated, but animated. "Usually real-time cloth animation is real-time simulation, but we have pretty advanced cloth going on for a real-time piece, so we decided to simulate it offline," says Körner. "The problem here was that the character wears multiple layers of cloth – his underwear, his shirt, his robe – making real-time simulation almost impossible, so it's not happing on the fly. This way there weren't any unexpected results like the cloth cutting through the body and that kind of thing..."

In order to achieve the best results, Unity and Passion Pictures made use of Unity's point cache. "Basically the point cache is a way of simulating animation offline," explains Zioma. "You have a surface and the point cache will drive the vertices, but it still keeps all the normals, all the setup and all the materials from the geometry itself. That drives every vertex afterwards." On top of this, Unity also integrated Catmull-Clark tessellation, an industry-standard in film that enables artists to subdivide an animated mesh and smooth its geometry.

> "The hero doesn't speak at all in the piece but he still has a lot of facial expressions... They're very extreme in many cases... to show the system's ability to do more than just the stereotypical real-time expressions"
>
> **Erland Körner,** technical artist, Unity

The explosions towards the end of film were created using custom scripts. It was NVIDIA that created the effects and also provided much of the integration

PARTICLES & EFFECTS

Passion Pictures didn't just want to make a real-time movie, but more one that could pass for something pre-rendered. This meant Unity's particle system, Shuriken, had to be cranked up to the full, with the main character smashing through windows, bursting through walls and wreaking havoc.

"Shuriken was more than sufficient for the FX artists' requirements for the things we have going on in the movie – smoke, bottles, sparks, mesh particle effects, all of that," says Zioma. "It's component-based, so we can stack a lot of modifiers and animate most of the properties. We also used the architectural shader Mia for the particles – meaning the artists could shade it or do anything they wanted to it."

In 'The Butterfly Effect' there are two main types of particles evident: mesh particles and the standard billboard particles. "For the smaller particles like smoke and sparks it's usually just billboards – that is, flat, sprite-like textures that face the camera," says Körner. "Such effects were used very extensively throughout the short, even for subtle things that are hardly noticeable on first viewing. However, if you turn [them] off you notice... the fumes from cars and the atmospheric smoke..."

One of the main benefits of the Shuriken particle effects engine is the fact that it enabled the artists at Passion Pictures to quickly iterate and see their changes quickly, even pausing the effects mid-action, playing with the parameters, and then rewinding and playing again to see how it had been altered. "You can change the size, colour, texture or material. You can even add or subtract the amount of particles that you need and test all the options," says Körner.

"We probably noticed the biggest difference between real-time artists and Passion's CG artists with regards to the effects," he continues. "They used a huge amount of effects for this movie, which are certainly not cheap! However, in some cases we were surprised that our particle engine handled such a huge amount of particles. It was a good test for us, having a CG artist testing our limits. In some cases they had a couple of hundred-thousand particles on top of one another and we didn't see any performance hit."

> "Shuriken had to be cranked up to the full, with the main character smashing through windows and bursting through walls"

Explosive effects

For the canister explosion at the end of the animated short, Unity and Passion Pictures wanted to create something more three-dimensional and spectacular than what was possible just using particles. As such they teamed up with NVIDIA to create beautiful, voluminous explosions that unfurl from small spheres into dense, vibrant balls of fire.

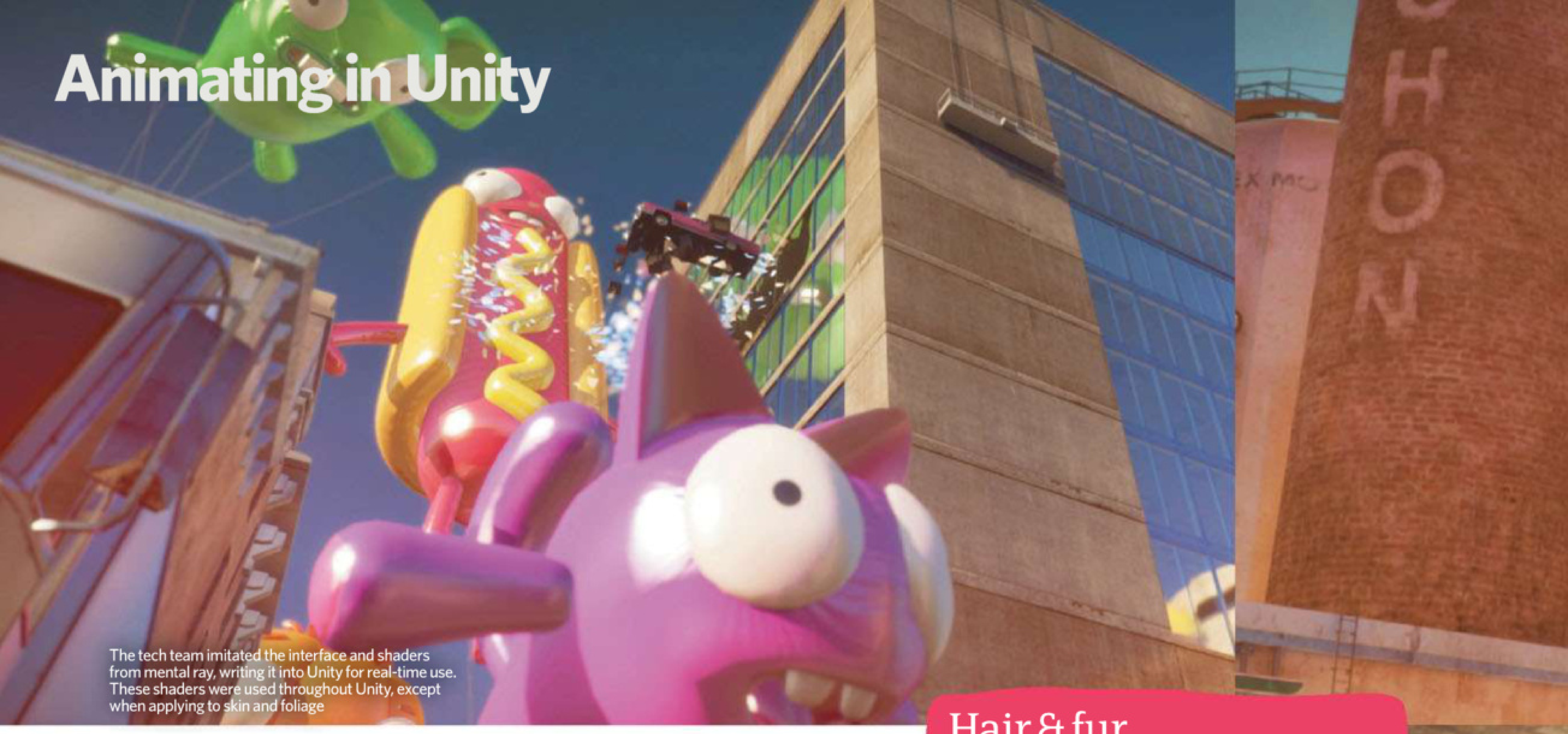
In order to achieve the effect, the team visualised fireballs using animated spheres, and created dynamic surfaces with 'ray-matching' and Pyroclastic Noise techniques. "It's probably the most technical piece of the film," says Zioma. "It's basically one very complicated shader that is put on the cube and around the spheres inside it. Every pixel on that cube sends a ray going through the volume of the cube, which moves through until it finds the surface of the sphere. It will then apply the Pyroclastic Noise – which is like a volumetric noise – around those spheres. It knows how far from the centre it is, how it's deformed by that noise and all of that will give it a certain colour. For example, if it's far from the centre of the explosion it will get a darker colour; if it's closer, a warmer colour.

"Ultimately it's a method of raytracing, but in this case it's done only around that explosion," he concludes. "It's how the explosions in the movies are done, by using raytracing and the Pyroclastic Noise to modify the underlying simple geometry. In the past it was only movie-related, but now we can do it in real-time."

Light can be constrained to each of the fireballs, meaning that they light the environment in real time as they move

> "It's how the explosions in the movies are done, by using raytracing and the Pyroclastic Noise to modify the underlying simple geometry. In the past it was only movie-related, but now we can do it in real-time"
>
> **Renaldas Zioma,** senior developer, Unity

Animating in Unity



The tech team imitated the interface and shaders from mental ray, writing it into Unity for real-time use. These shaders were used throughout Unity, except when applying to skin and foliage

> It was the skin of the main character that posed some of the greatest challenges faced by the Unity artists, with the team developing a SubSurface Scattering shader to replicate the layers of human flesh and skin

MATERIALS & TEXTURES

Considering its status as a real-time film, the textures and materials witnessed throughout 'The Butterfly Effect' are impressive indeed, from the grimy facades of buildings to the pores on the main character's face.

In fact, it was the skin of the main character that posed some of the greatest challenges faced by the Unity artists, with the team developing a SubSurface Scattering shader to replicate the layers of human flesh and skin – a technique used more commonly in pre-rendered creations. "It was something we worked on from the first day until the very last," says Zioma. "There are several layers of this SubSurface Scattering – it basically simulates how the light comes into the skin, gets diffused, goes through a bit more light and is then diffused again in a different type of the tissue. It's done using three layers of texture space diffusion and two specular overlays." The translucency of the skin shader meant that it could also be used for plastic surfaces, with the team applying it to such objects as the short's festival balloons and the white kettle featured in the opening sequence.

There was still a huge range of other materials that needed to be rendered, however, so Unity created a subset of shaders inspired by the mental ray architectural shader. This meant the team could use a standardised single shader throughout all environments, from buildings to cars and even particle effects. The result was near-offline rendering intuitively, which was useful for Passion Pictures' CG artists, given they were used to the interface.

"We developed a core shading library that mimics how mental ray works, so all the shaders you see are close to the architecture of mental ray shaders," says Zioma. "We took all the interface and all the parameters there and tried to mimic it as closely as possible – we wanted to provide the artists at Passion with a workflow that they were used to, for offline rendering."

Amazingly, any shader can be tweaked or adjusted flexibly. "The artists can adjust the parameters directly and test results in real-time, resulting in much quicker turnarounds," says Körner. "We're trying to offer the exact results of what the CG artist is used to getting in full-CG productions; there were not many features or parameters that were left out that they would use otherwise. To achieve this, one programmer would team up with an artist [who] would feedback continuously on the improvements we needed to make to the shader, until we got exactly – or close enough – to what was feasible in real time."

Hair & fur

Another huge point of focus for the team was hair in Unity, with a system created by NVIDIA used on both the head of the main character as well as for his fluffy rabbit slippers.

The variety of styles for each can be tweaked quickly, with artists able to amplify a set of guide hairs using hardware tessellation on the GPU. "You can easily control the volume of the hair this way, adding more and more hairs around the base mesh," says Zioma. "The artist can then control or animate that base mesh if they need to. If we are doing procedural animation, in some cases we can modify the base. On top of that we can add more polygons to each hair strand if we want... there's also noise that can be applied to get small variations – and this can be animated, as well. There's a Shader parameter that enables us to change the colour of his hair too, plus a separate lighting rig that enables us to light it in different ways. Basically, we have plenty of flexibility in terms of variation and volume."

According to Körner, additions such as parameters that define the clumping of the hair were added to meet the desires of Passion Pictures' CG artists. "They wanted to give the impression the strands were sticking to one another a bit to achieve a much more realistic result than what we've seen previously in real time, where the hair was just evenly spread and not so realistic."

The main character has two basic sets of hairstyles: his bed head and a pushed-back look for when he moves downhill. It's animated quite simply by changing some values to slightly tessellate the hair

> Parameters that define the clumping of the hair were added to meet the desires of Passion Pictures' CG artists

Animating in Unity

Learn the art of Rigidbodies in Unity in our **Masterclass tutorial** page **84**

Unity built live-time scrubbing into the editor so the artists could preview without needing to compile. They also added the ability to preview the scene camera in the Game View, in order to see the final shot with all post-processing effects

"The artists often felt that the results they were achieving were close to what they would get in offline rendering!" exclaims Körner

> "The effects artists could easily adjust the parameters of each simulation in Unity, perhaps changing the amount of bounce on them, the amount of movement, or constrain the simulations within a certain area"
>
> **Erland Körner,** technical artist, Unity

REAL-TIME SIMULATION

'The Butterfly Effect' features several examples of real-time simulation, mostly involving complex Rigidbody interactions between objects. One of the most impressive examples of this is towards the end of the animated short, where hundreds of gas canisters tumble and bound down one of San Francisco's steep hills. The scene was created using a mix of Unity's features and NVIDIA's Apex engine for Rigidbody and shattering effects.

"For the scenes with more physical interactions, like the canisters that were jumping or bouncing down the street, we used Rigidbodies," says Körner. "The particle system is probably capable of producing something similar, but as these objects are simply larger, Rigidbodies felt like a more natural way of approaching it. It's using the same functionality that's in Unity 3.5, with the effects artists able to animate the canisters that are falling down, if need be."

Another example of real-time simulation comes when the main character is violently flung through the window of a diner, sliding along a counter and knocking down everything that stands in his way. "We've got this guy flying through the diner in one of the shots and he's pushing past plates and glasses," says Körner. "With all of these Rigidbodies flying around everywhere it gives the scene a really dynamic look. It's all completely in real time; all of these plates, glasses, soda cans and ketchup bottles and everything reacting in a realistic and believable manner."

As with all elements of 'The Butterfly Effect', the parameters of these simulations are entirely modifiable. "The effects artists could easily adjust the parameters of each simulation in Unity, perhaps changing the amount of bounce on them, or the amount of movement, or constrain the simulations within a certain area," explains Körner. "They could just play with the amounts of everything and run the simulations until they got the right look. Even in the case of the canisters, we had a lot of them, but we could have had even more! Sure, the scene didn't really *need* any more canisters – it would have been a bit absurd – but it would still have been running smoothly."

You can learn how to create these effects yourself on page 84, where Erland Körner explains the process of simulating Rigidbodies in Unity.

"The real-time shadows from the character are never baked, of course, but the environmental shadows and indirect illumination such as a secondary bounce are baked onto the lightmaps," says Zioma

LIGHTING

The team at Unity knew that to sell the game engine as a visually powerful tool, the lighting needed to be just as impressive as in any other CG movie. As such, to light the movie they mixed real-time direct illumination and indirect light baked into lightmaps and Light Probes.

"The Light Probes store the indirect illumination for all moving objects," says Zioma. "They're basically a bunch of points in space that capture the incoming indirect lighting and all of the colour bleeding. We then apply that onto the objects in the area. For instance, the neon lights and the Chinese lanterns in the scene where the main character is falling do not actually contain a light source. They're casting emissive light from the material itself, which is applied to these Light Probes.

"It doesn't need to be a light source from emissive surfaces, though," continues Zioma. "They capture all incoming light from any source and store that information, so when we run the character we pass that information into the shader, sample it as lighting from the different sides and finally apply it to him. The Light Probes are connected in a volumetric structure, so for every point inside that structure we easily know exactly which are the closest spheres and we can construct the lighting on him from those Light Probes.

"Basically, all of the lighting is the combination of real-time light and all the indirect light that is coming from the dynamic objects and the Light Probes," concludes Zioma. "It's all fairly fast in terms of rendering the light onto the characters – notice the scene when the main character is falling, the light cast on him changes very fast indeed."

For ambient light the team used HDR image-based lighting, providing realistic colour from the Skybox instead of a single ambient colour and intensity. Ambient occlusion also played a big part in this regard, with a new method developed by NVIDIA called horizon-based ambient occlusion. "Usually in videogames you put the screen-space ambient occlusion on top. However, when it was developed for use in the movies, ambient occlusion was meant to modify only indirect illumination," explains Zioma. "If the light comes directly from the sun it shouldn't be occluded by the ambient occlusion – only the indirect lighting. So what we do is first calculate screen-space ambient occlusion and then pass that texture into all the shaders, which can then apply it properly. It's not a post effect on top, but it's passed as part of the lighting process, so it darkens only the indirect illumination. It darkens only during the bounces... meaning it doesn't make your image as dirty-dark as it normally would."

Another technique adopted by the team at Unity was colouring its ambient occlusion. "Usually in videogames you would just do a black pass, but in 'The Butterfly Effect' we found that making it a different colour actually improves the image. Usually we used something a little bit more like a sky colour for our ambient occlusion, which improves the look of the whole thing. That's another thing that we learned from collaborating with the CG artists at Passion."

In fact, Unity learned a great deal from the artists working on 'The Butterfly Effect', tweaking and refining the engine and building it into a tool that could one day offer real-time graphics on a par with Unreal or CryEngine. "One of the interesting things about working with Passion was that we had a lot to learn, I think. There was a lot for us to pick up on," admits Körner. "Many of these things that we researched are available in Unity 4.0. However, there's still a lot of other things that we learned that we will, hopefully, continue to implement in future versions of the Unity engine."

"Most often in games people store the wall lighting on the environment into the lightmaps. We only store indirect illumination, which allows us to tweak the lighting direction quite easily," says Zioma

25 TIPS AND TRICKS

01 Auto Rigging
A shortcut for rigging and skinning your character is to upload your mesh to Mixamo and let its Auto-rigger do the work for you!

02 Cap particle amounts
Max Particle Amount is an easy and flexible way to limit the amount of particles to a certain level, instead of changing the particle rate.

03 Mipmap sharpness
Familiarise yourself with the Mipmap settings (in the Texture Inspector). Kaizer settings can enhance transparent textures for tiny particles that become vague or blurred with distance.

04 Heightmap to Normal map
Unity converts a Heightmap to a Normal map and instantly updates the texture when you save, enabling you to change and see the results of your Heightmap iteratively, without frequent manual Normal map conversion being required.

05 Simplify materials
Keep the complexity of materials to a minimum for optimal performance. Begin with basics, add functionality as needed and avoid leaving unused Parameters or Texture slots. It's worth knowing that the material stores previous settings, enabling you to switch materials back and forth while keeping values.

06 Reduce ambient light
Reducing the default ambient light and replacing it with baked skylight, less shadow intensity and Light Probes provides contrast and lighting that's less flat!

07 Cookies
Use cookies to mask your light sources. Regardless of whether a Directional, Spot or Point light, it enables you to paint your own light shapes and so shed more detailed and non-uniform lighting. For experienced lighting users, generate a 'Best Settings' file and edit this to provide advanced properties.

08 Unwrapping Lightmap UVs
Unity can generate Lightmap UVs for you (Import settings), which is an effective time-saver. Experiment with different Unwrap values to get the best results with fewer UV shells or distortion.

09 Combining baked and real-time lighting
If you want to separate how light affects characters and environments, you can duplicate and parent new light. Set the Lightmapping type on the original light to Baked Only and Realtime on the duplicated one. Now your baked and real-time lights can be more intense, have a varying hue or even a different type.

10 Saving Baked Selected
To save more time and add flexibility to your workflow, combine the Save Selection and Bake Selected buttons in the Lightmap window to keep different sets of test bakes that you can switch between.

11 Landscape and large-scale Lightmap resolution
Temporarily set your Lightmap resolution in the Lightmap Inspector to a very low amount. The checker overlay will then become much larger and give a clearer approximation when you overview the Lightmap resolution in a large, complex environment – for instance, a sprawling city.

12 Interactive light baking
Set your light baking to a low quality or keep a high quality and set Final Gather Rays, the amount of bounces and the Lightmap Resolution to a reasonably low amount. Do lots of iterative bakes and gradually increase the amount and quality as you nail the look, light angles and GI amounts.

13 Making mirrors
To replicate a mirror you can use a Render texture to create real-time reflections. The script and shader for this can be sourced from the Unify Community Wiki (**wiki.unity3d.com**). When using the ready-made scripts, you must create a horizontal plane and rotate it *after* you've attached scripts and shaders.

14 Universal file format
Export FBX files if you are working collaboratively on a project. Doing this encourages a modular workflow and more importantly doesn't require your collaborator to own the 3D application on their machine. This feature proves indispensable when working with colleagues and clients globally.

15 Multiple cameras in Game View
In Unity you can render multiple cameras in Game View using the Camera Normalize Viewport setting. This means you are able to divide the Viewport with several cameras, different post FX components, skies and property settings. This enables you to more easily assess every angle and scrutinise every detail.

16 Transferring component changes from Play mode
You can easily copy and paste components and values between GameObjects. If you want to keep changes that you made while in Play mode, copy the values and paste them back onto your component once you exit Play mode.

17 Blocking out visuals
Mesh primitives can be scaled, rotated and applied with materials. This is useful to block out an environment and prototype. Once you're happy with the layout and composition you can replace the shapes with detailed geometry.

18 Making notes
Brainstorming, planning or giving feedback? Then use 3D Text to make notes or place markers in the scene environment. The component can be constrained to placeholder art with a description, alteration or idea.

19 Refreshing content
Unity refreshes assets and textures automatically and instantly. Maximise or detach Unity's Game or Scene view and keep that window next to your other open program on your desktop to easily see refreshes.

20 Isolating art pieces
By placing content in layers you can show and hide those layers, or copy selected content, and then paste into a new scene. You can also give the GameObject a unique name in the hierarchy and search for that. Doing this will grey-out remaining art.

21 Template packages
Export commonly used templates, lighting, setups, textures, meshes and other favourites to a custom package, which you can re-import into new projects when you need them.

22 Surveillance cameras
Place multiple cameras in the scene and switch between them. This way you can quickly keep track of changes at different locations as your instanced art, layout and lighting progresses.

23 Alternatives of viewing
Move to View, Align to View and especially Align View to Selected are all useful workflow-related tools once you've got the hang of them. You can use them to quickly inspect art from various angles or move an important object into view.

24 Inspector locks
Locking and adding inspectors gives the flexibility to make changes to multiple GameObjects, components or materials.

25 Asset Store content
The Asset Store is a powerful feature of Unity. It provides you with a huge selection of content, such as vegetation, vehicles and other assets including tools to quickly get your project up to speed.

storemags

THE SKILLS TO SUCCEED

Career progression in a creative industry isn't easy. To make it, you need the skills employers are really looking for...

Words: **Poz Watson**

Having a degree isn't enough, nor is just knowing software packages. If you want to make it in the 3D industry then you need a raft of skills that courses may or may not provide.

Alex Hope, managing director of VFX house Double Negative, is the co-author of the Next Gen Skills report (**http://tinyurl.com/nextgenskills**), which outlines what people should be studying in order to be employable. "We want people who are doing maths, physics, computing science and art and are keen to follow those through to a high level," Hope says.

"It's not helpful to have art and science subjects separated from one another [at school]," adds Sofronis Efstathiou of the National Centre for Computer Animation (NCCA) at Bournemouth University. "Neither is it advantageous for schools to timetable lessons so students are forced to choose one or the other." In order to better educate children, teachers and parents, the NCCA has set up the BFX Festival (**www.bfxfestival.com**), to be held this year.

Don't panic, though, if you don't have a qualification in physics: there is no single route to your dream job. "Individuals, their passion, their talent, the way they approach trying to progress their career and their belief in themselves is the key," says Hope. If you have the passion and you're looking for success, keep reading for helpful advice.

Read the Next Gen Skills report: http://tinyurl.com/nextgenskills

This all-terrain vehicle was created by Gnomon student Diego Gonzalez
Image courtesy Gnomon School

StoreMags

The skills to succeed

This AT&T advert, intended for a much-watched Superbowl slot, was worked on by Andy Nicholas at The Mill
© BBDO/Rabbit Content/The Mill

GET THE RIGHT FOUNDATIONS

For someone still in education, the message is simple. The focus should not be "Maya or 3ds Max and learning what button to press or how to follow tutorials," says Karl Wickens, co-head of 3D at Double Negative. "It's really *why* to do those things." The traditional sciences teach how to analyse a problem and come up with solutions; design teaches to take on a brief and art exposes students to the aesthetic fundamentals they'll need in all of these jobs – things like composition, lighting [and] the ability to create a pleasing image.

If you can combine scientific understanding with an artistic eye, you will stand out, says Hope, explaining that his "favourite acronym of the moment is STEAM – so science, technology, engineering, arts and maths – those are the disciplines we are interested in".

Peter Claes, lead FX artist at Method Studios, grew up in Belgium and comments: "I wish they would use 3D software in high school to teach mathematics. It would make things so much less abstract and so much more applicable. It was not until I was 17 that I was able to use a lot of my mathematical knowledge directly through expressions in a 3D application, and that was an amazing moment."

Choosing the right degree is vital. Hope says: "We see real success from courses that enable students to do their learning at a workstation in groups, where there is a good project basis to what they are doing, so that they're working in a manner that's consistent with the way we work in the industry. Where they are less successful is if they've got one tutor in the lecture hall with 60 people in it and they are not hands-on."

The NCCA in Bournemouth is a desirable choice, with its focus on working the way the industry does is a part of its great success. On his Masters degree in 3D Computer Animation, Han Xiang Chua explains: "We pitched story ideas to the [group, and we] worked in teams, applying what we'd learned, from pre-production to final result, for [a period of] eight weeks. The school then invited lecturers and guests from the industry to [give] feedback [on] our work in progress."

For some people, the right degree will be in a traditional subject. Andy Nicholas, a senior technical director (TD) at The Mill, chose to do his degree in physics because he thought "mathematics was too theoretical and engineering was too applied. The nice thing about a physics degree is that it has so many applications within CGI."

Alternatively, some students go away and focus on their art. For Solomon Rogers, senior lecturer of 3D Animation at the University of Hertfordshire, an art and design foundation course is perfect to apply to university with, reporting that "these students start higher in the class with a more mature attitude and continue to stay at the top of the class".

As soon as you start a course, you've got to start thinking about your next step. From September this year, NCCA students will do an industry placement year "to allow them to gain experience in their respective field while contributing to the development of professional projects", Efstathiou explains. He continues that students "can then really focus on refining their craft during their last year of study once they've had a taste of the real world."

'The Infernal Machine' was a short Han Xiang Chua worked on at Bournemouth University. He was recruited by Lucasfilm Singapore before graduation
© Harold Cheng, Han Xiang Chua, Yeow Kuang Lai, Wei Yong Teo

Our panel of experts

Alex Hope Managing director
Employer Double Negative
Expertise VFX, film, the creative industry

Karl Wickens Co-head of 3D
Employer Double Negative
Expertise 3D, VFX

Alex Alvarez Director, president/CEO
Employer Gnomon School of Visual Effects
Expertise Training, creature development

Sofronis Efstathiou Postgraduate framework leader, NCCA
Employer Bournemouth University
Expertise Lecturing, animation

Solomon Rogers Senior lecturer, BA (Hons) Digital Animation
Employer University of Hertfordshire
Expertise Lecturing, VFX

Peter Claes Lead FX TD
Employer Method Studios
Expertise VFX, scripting

Sean Dunderdale Lead 3D artist
Employer Saddington Baynes
Expertise Modelling, animation

> "Individuals, their passion, their talent, the way they approach trying to progress their career and their belief in themselves is the key"
>
> **Alex Hope,** managing director, Double Negative

The skills to succeed

A 3D trail system was created in Softimage and used to visually tie together the different aspects of this BT advert
© AMV/HIS London/The Mill

'Red Room' is a web-based animation created by Sean Dunderdale for Saddington Baynes
© Saddington Baynes

Gnomon School student Jorik Dozy created this digital matte with Maya and Photoshop
Image courtesy Gnomon School

> "There are 18 VFX roles on the UK's shortage occupations list... it proves the demand is out there"

GETTING THAT FIRST JOB

Once you reach the final year of your course, get networking. There are 18 VFX roles on the UK's shortage occupations list, and even though these aren't necessarily entry-level, it proves the demand is out there. Companies need talent, so show them what you can do.

At Double Negative, for instance, they have two main entry-level roles, with up to 50 individuals working as match movers and another 10-20 computer science graduates as assistant technical directors. The interesting thing about match moving is that it's "something you are unlikely to have studied in any depth during a degree," says Karl Wickens. What's so useful about it – from the point of view of progressing – is that it's a task in that "we can tell individuals that they are either right or wrong and we can explain why... it's good for people to learn to deliver to expectations," he adds.

Alternatively, find the companies you most want to work for and apply to be a runner. It's unpaid and can be hard work, but Hope started as a runner – and he's now Double Negative's MD! As well as getting your foot in the door, it gives you access to a company's training opportunities, which is how you can make progress.

Over in the USA, Alex Alvarez, the founder of the Gnomon School of Visual Effects, says: "97 per cent of our students move into paid positions when they graduate. A small percentage of our higher-term students choose to take internships at studios, which are sometimes unpaid, if they receive school credit".

Jo Plaete graduated from Bournemouth in 2008. He says: "I got in touch with Framestore London through one of my Bournemouth lecturers, and I started working for them after finishing the course... I started out at Framestore, which was a good introduction to the industry... as it taught me a lot about the internals of a big pipeline. I worked there mainly on *Where the Wild Things Are* (2009)."

Another NCCA graduate, Han Xiang Chua, had Lucasfilm Singapore come to him. "I was approached by a recruiter and asked to do an animation test [while] I was preparing my production bible for my Masters project," he says. "I've worked on three episodes of the [*Clone Wars*] series [and] given a chance to animate... Anakin Skywalker, Ahsoka Tano and R2-D2."

Efstathiou isn't surprised by their success, though: "I expect my students to rise quickly through the ranks within whatever creative field they choose to undertake. NCCA graduates have an excellent exit velocity when they leave their course; they are quick learners, problem-solvers and highly creative – superb skills to possess in such a fast-moving industry. Most will start as junior artists or technical directors; some may already possess industry experience so will start a little higher."

How high you start is one issue, but where you should head for is even more complicated. Karl Wickens, co-head of 3D at Double Negative explains: "We have about 40 distinct skills that people are tested on. Any one of those skills could be a full-time job." From concept artist at one end to pipeline TD at the technical end, use your degree to get some idea of where your strengths lie.

Jorik Dozy. Image courtesy Gnomon School

Jo Plaete was the visual effects lead on *A Monster in Paris* by Brussels-based Walking the Dog
© Walking the Dog

WHAT DIRECTION SHOULD YOU TAKE?

If you know you want to work in CG but aren't sure of more than that then going back to university is one option. Having a Masters degree not only gives you more time to decide what you want to do, but it's also another big tick for your CV. Claes did his Bachelors at the NCCA, and through that spoke to various industry professionals. It was one of them that convinced him to continue his studies and "go for the MSc [in Computer Animation and Visual Effects], as it would allow me easier access to travel Visas, teach at university and [get] a higher entry-level position," Claes explains.

Of course, for some people their career is little more than a series of happy accidents. Sean Dunderdale graduated from the University of Hertfordshire and was offered a contract with a theatre company called Snap. "I was commissioned to create full CG-animated environments that would be projected onto the stage and replace a physical set," he explains. "In some cases the actors would have to interact with characters in the CG scene that had been filmed on a green-screen set and keyed out. I was responsible for all CG work and green-screen set supervising right out of uni. It was a great learning experience and gave me plenty of work for my showreel." After that he became a junior 3D artist at Saddington Baynes. Again, working in a small team gave him a lot of responsibility. "Everyone was expected to have a broad skillset and be able to take a shot from concept to completion," he adds.

But if you join a big company, you'll need to work on a smaller section of the pipeline. Hope says that "as the work becomes more and more complex, we do see the need for specialists." But with those 40 areas of work, generalists are in demand, too. "From the point of view of being an individual, being more generalist gives them more investment [and] more of a sense of ownership over part of a film," explains Wickens. "It's great when we have a small team of people, who ideally sit together and are able to take on an entire shot or an entire sequence of work because they are all working together." Furthermore, being a generalist protects you from a company sizing up and down as projects come and go, because "if we don't have work in their primary skill, it's likely that we'll have work in one of their other skills," Hope adds.

BUILD YOUR CV

As the highlights of Jo Plaete's career demonstrate, you can quickly build up an impressive roster of skills

This breakdown reveals Plaete's career route so far, and where his education has led him...

EDUCATION

West-Flanders University, Belgium (2003-2006)
Course: BA New Media
Projects worked on: Intro for annual Multi-Mania conference
Core skills learned/ used: Programming, web development, Flash, graphic design, 3ds Max

Walking the Dog, Brussels (2010-2011)
Job title: Visual effects lead
Projects worked on: *A Monster in Paris*
Core skills learned/ used: Softimage, ICE, Python; 3ds Max, FumeFX, Krakatoa, NUKE, team leading

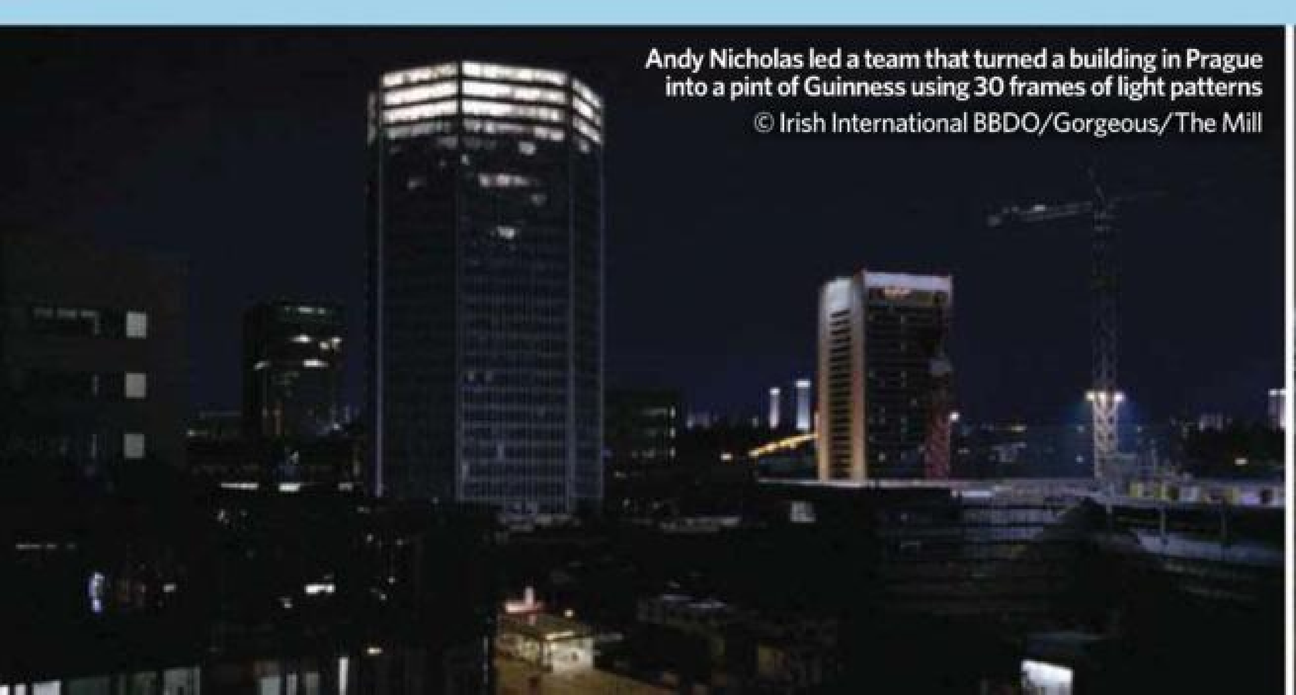
MPC, London (2012-present)
Job title: Senior/lead crowd technical director
Projects worked on: *World War Z, The Lone Ranger*
Core skills learned/ used: Internal MPC Crowd system ALICE, Python, MEL, LUA, C++ programming, Maya

CAREER

Framestore, London (2008-2009)
Job title: Assistant/ pipeline technical director
Projects worked on: *Where The Wild Things Are*
Core skills learned/ used: Pipeline programming; Maya; MEL and Python; Linux

Animal Logic, Sydney (2009-2010)
Job title: Animation TD, crowd TD
Projects worked on: Legend Of The Guardians
Core skills learned/ used: Softimage, ICE, Python, C++

NCCA, Bournemouth (2007-2008)
Course: MA 3D Computer Animation
Projects worked on: *Path to War* crowd simulation
Core skills learned/ used: Softimage, Maya, Massive, RenderMan, Python programming, NUKE, 3D animation principles



Andy Nicholas led a team that turned a building in Prague into a pint of Guinness using 30 frames of light patterns
© Irish International BBDO/Gorgeous/The Mill

Jo Plaete worked hard on the crowd scenes in *Legend of the Guardians*
© Animal Logic

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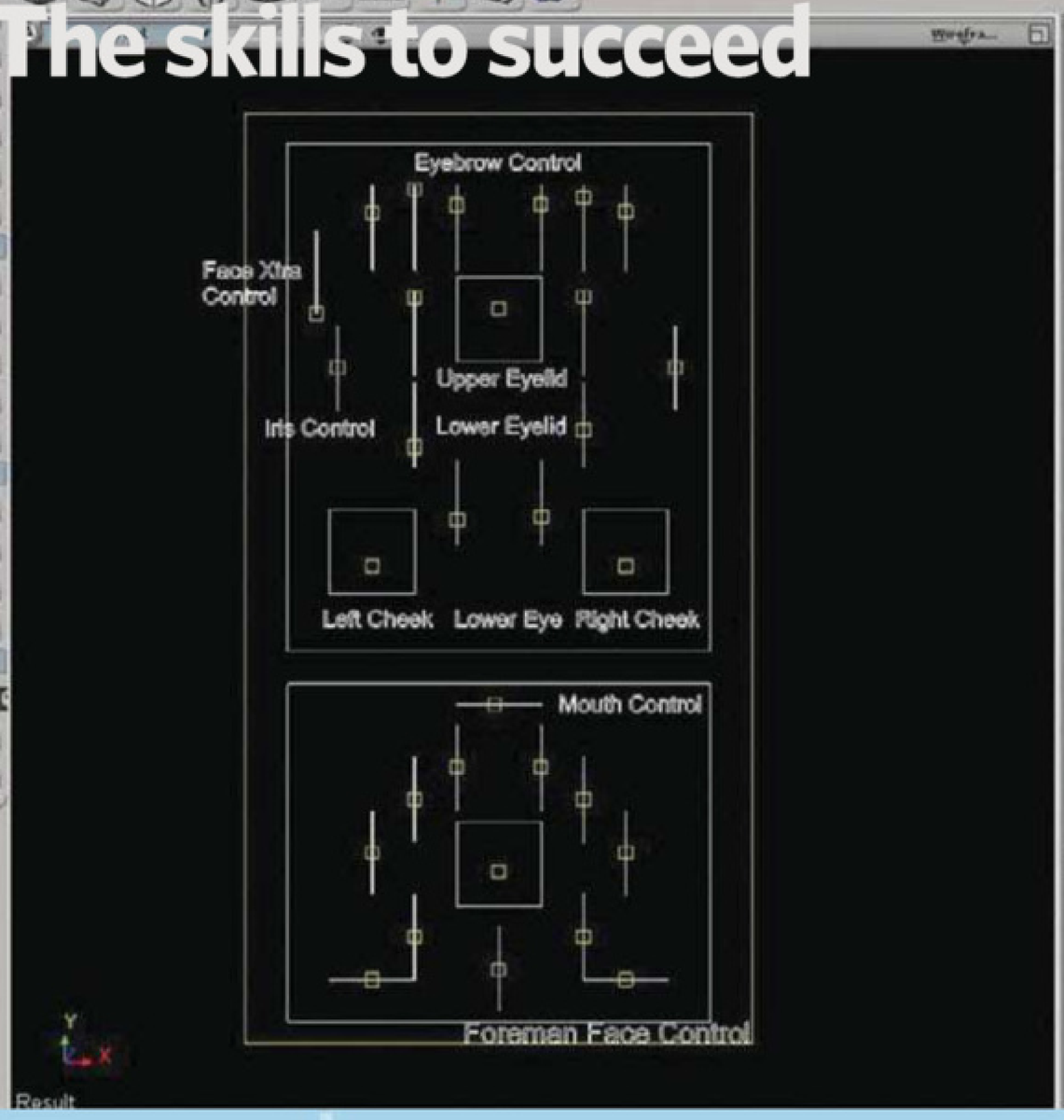
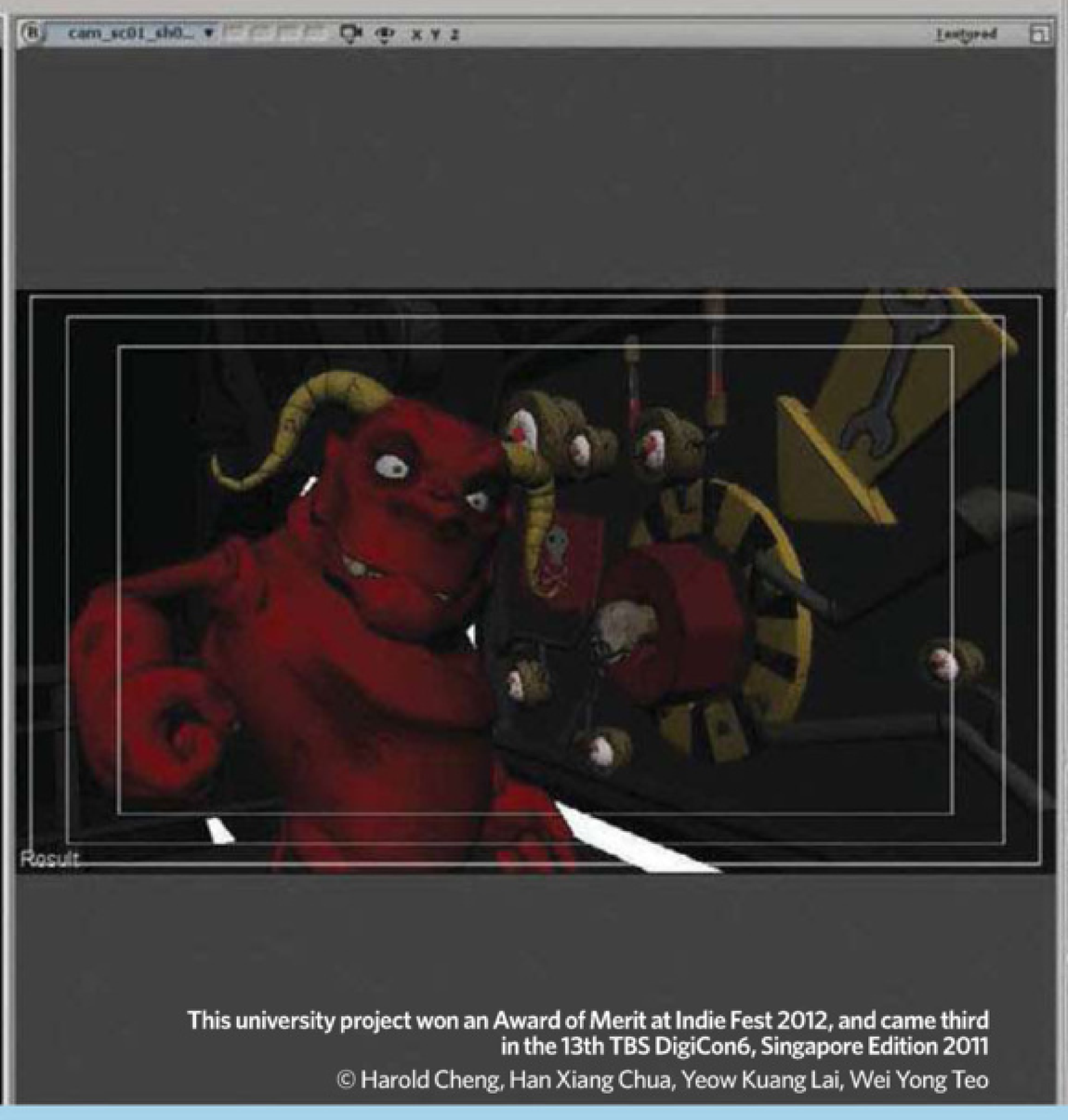
The skills to succeed





This university project won an Award of Merit at Indie Fest 2012, and came third in the 13th TBS DigiCon6, Singapore Edition 2011

© Harold Cheng, Han Xiang Chua, Yeow Kuang Lai, Wei Yong Teo

STAY ONE STEP AHEAD

Getting your first job in your dream profession – even if it does feel like a big break – is not the same as carving out a career. Claes worked on the effects for the Therns in *John Carter* (2012) at Cinesite. He explains: "This was a very ambitious effect that eventually required a lot of custom tools and setups created by a team of skilled TDs. I worked [on it] for about one year and ten months, and learned a ton about data management, custom tool building, chaos theory, artificial intelligence, procedural-animation techniques, render optimisations and a bit of coding and scripting. It was so complex that near the end of production it took about a month to teach someone all the tools from scratch."

Claes' aim is now to take on larger teams, eventually "progressing into the role of CG supervisor, effects sequence lead, head of effects and finally visual effects supervisor". He learns from whatever sources he can, and at the same time passes "on the knowledge to my juniors and [I can] show them my setups so they can become more independent too. This builds confidence and respect in a team, which is crucial to be able to finish a project to a high standard on time".

In short, you need to be a can-do person. Alvarez points out that one of the key skills of the successful is "the ability to not need to have all instructions handed to them on a silver platter. The more that an artist can creatively contribute to an asset or shot, given loose direction, the more valuable they are and will become".

There are always going to be new versions and even newer programs to keep abreast of – it's the nature of the industry. But as you progress upwards, you'll be in charge of more people and perhaps more of the pipeline, so understanding the skills and tools that sit around yours is crucial, too. In addition, there comes a point where – if you want to be promoted – business, management and people skills come into play as well.

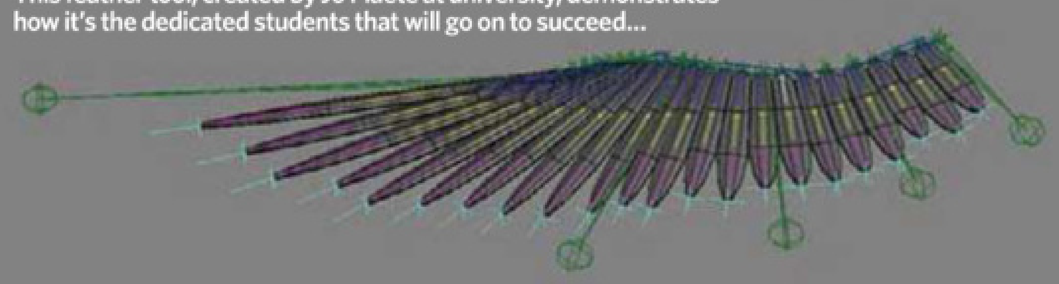
The Next Gen Skills report identified a skills gap in the UK games and VFX industries. "There is no quick fix to where the skills gap is because it's a problem that's particularly acute at higher levels," says Hope. "We want to do our bit to help solve that problem through training – formal and informal – at Double Negative, and I know the other effects houses in London do the same." You can visit **www.dneg.com/career_info** in order to find out more information about careers at Double Negative, and if you work there not only do you have access to their training but also all of the software – so really there's no excuse not to keep on learning.

For those that aren't so lucky to work at this kind of company, external training is an option. Gnomon School offers full-time education packages in the USA, but it also has an extensive body of training that can be taken online or via video format (visit **www.gnomonschool.com**). "About one third of our students are full-time and the rest are extension, with about half of [those] being professional artists who are learning new tools or techniques," Alvarez adds.

Claes describes that at university there is "a core group that pushes the entire class along". The same is true of the professional world, so surround yourself with those positive, talented people and you'll go far. "Your learning curve accelerates when you learn from your own problems as well as from others'. Sharing knowledge is in your best interest, as others will share with you, too," adds Claes.

> "The more that an artist can creatively contribute to an asset or shot, given loose direction, the more valuable they are and will become"
>
> **Alex Alvarez,** director, president/CEO, Gnomon School

This feather tool, created by Jo Plaete at university, demonstrates how it's the dedicated students that will go on to succeed...



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> Make sure that [you] have a solid set of skills [to] fall back on – outside of learning which button to press in a particular application

Andy Nicholas was one of the team from The Mill that created 110 shots for the Barclaycard Waterslide advert

© BBH/Gorgeous/The Mill

CHANGING PATHS

Especially in this sort of economy, it's not surprising that a lot of people end up taking any job they are offered. If that means you end up going down a career path that you didn't intend, it's never too late to pick up those breadcrumbs and find your way back again. The key is to be able to explain to potential employers what your skills are and how they transfer to the industry you really want to work in.

Of course, most people's jobs will vary a little along the way. Plaete, currently a senior crowd TD at MPC, explains that he has worked in "pipeline technical directing, animation/character tools, crowd simulation and effects." He believes a good TD should be "versatile and should be able to apply his technical skills on multiple sub-domains of the production pipeline. It's great to focus and become an expert in something very specific, as it will push up your value, but a change of scenery from time to time doesn't hurt either."

Andy Nicholas is now a senior TD working in commercials at The Mill, although he spent the first eight years of his career in games. It was studying at the National Film and Television School (NFTS) that first enabled him to make the switch, but largely the skills he has used in both industries are the same. Taking into consideration the unpredictable nature of the job market in VFX, he advises that people "make sure that they have a solid set of skills that they can fall back on, outside of learning which button to press in a particular application. Spending some time in a related industry can be useful [in order] to gain wider experience and, should the worst happen, to fall back on for an alternative source of employment".

If moving industry is deliberate, think about the skills gaps that you need to fill. Han Xiang Chua has previously worked as both a graphic designer and an animator, and is about to take a job as a match mover at Double Negative in Singapore. He plans to polish his animation reel at the same time. If he could start again, he would "want to focus more on character animation and learn more about scripting... I've realised that scripting plays an important part in production, and it will be an advantage to me if I have some knowledge of it".

Dunderdale echoes this opinion, saying: "If I could go back and start again, I would probably try to learn MEL/Python/scripting in general from an earlier stage. Because being able to code your way out of a dead-end or shave off several hours of tedious work with an automated tool is invaluable. I think I would also have bought a DSLR earlier and started learning about different real-world cameras."

In essence, you will be able to switch industries and progress your career if you have those STEAM (Science, Technology, Engineering, Art, Maths) core skills. How you apply them is up to you.

FROM ONE INDUSTRY TO ANOTHER

After eight years in games, Andy Nicholas transferred his skillset to VFX. Here's how...

	GAMES	VFX
Programming:	Andy found it was worth the time "writing scripts and plug-ins to help myself and other artists create assets and assist with getting the data into the game engine"	As a senior TD at The Mill, Andy now writes Python scripts to assist with tools and pipeline tasks
Physics & Maths:	Andy once used his physics degree to "program a dynamics engine to simulate collisions and the mechanics" for a driving game	"Whether it's rigid-body simulation or dealing with how light refracts in a shader, it's all based on the laws of physics," explains Andy. "Linear algebra and vector maths are also an essential part of my day-to-day work, enabling me to solve problems"
Aesthetics:	Andy has always had "a keen interest in drawing, art and photography"	The same sense of aesthetics has been vital throughout his career. "[It] covers a lot of areas: composition, animation, lighting and shading," he explains. "In the trade it's known as 'having a good eye'"
Communication:	Andy quickly learned to communicate between programmers and artists, as "they speak different languages and have very different priorities"	At The Mill he also does some on-set VFX supervision. "Working on set can be a highly stressful environment, which makes clear and concise communication even more critical"

The skills to succeed

> "Software is just a tool. It knows nothing. It does not know how things should look or behave. It is up to the artist… The journey of becoming a better artist never ends"
>
> **Alex Alvarez,** director & president, Gnomon School

Mobile Mayhem was one of the projects Chua worked on while at Bournemouth

© Han Xiang Chua, Yeow Kuang Lai, Harold Cheng, Ruha Merchant

BE EMPLOYABLE

There are no guarantees that your career will be brilliant and Oscar-laden. But to give yourself the best possible chances you need to be determined, hard-working and a little bit flexible. Plaete says: "Too often you see people holding onto a dream for too long – classic example, animation – and wasting other opportunities while doing so." Rogers points out that people who don't thrive are "weak on problem-solving and drive… the hardest of things to teach is a passion to succeed and work well with others. Trying to instil and mould someone's personality is almost impossible."

People skills are vital whatever industry you're in, but particularly so in a small one. As Rogers points out: "Everyone knows everyone, so if you want to get along there is no room for egos or bad attitudes, especially when you are just getting started. Treat everyone with respect and show passion and motivation – not stroppiness, gossiping, bad-mouthing and so on… Give out bad karma and it will come back with a vengeance in an industry this small. On the flip-side, be positive and helpful at all times, and your career will glide through with word-of-mouth recommendations passed from company to company."

It's not just about being pleasant; you have to be efficient and effective too. "You have to fit into a sometimes-stressful working team that has to hit deadlines, be efficient *and* creative – all under the stress of pleasing the client," adds Dunderdale. "You need to be an asset not just in what you can bring to the table in your particular package, but by being agreeable as a person, [which] goes a long way, too."

Ultimately, your success or failure comes back to your mastery of the core skills. They'll vary depending where on the art/technology scale you find yourself, but you should know yourself what you need to put your time and effort into. As Alvarez puts it: "Artists interested in 3D need to understand that software is just a tool. It knows nothing. It does not know how things should look or behave. It is up to the artist, or operator, to understand form, composition, cinematography, anatomy, design, behaviour, physics, story, mechanics, engineering, architecture, art history and so on. The journey of becoming a better artist never ends."

THE SKILLS TO SUCCEED

Han Xiang Chua has worked in animation both before and after going back to university to do an MA in 3D Computer Animation. So how have his skills developed?

Skills used before going back to uni

2D animation • Graphic design • Illustrator •

"Having worked as a graphic designer helps me to be more creative and open to ideas. Most of the tools I've learned – for example Photoshop, Illustrator and Flash – are commonly used in production. I also use Flash to do 2D rough animations before I start working on my shot in 3D"

Skills used both before and after

• Character animation • Photoshop • Flash • 3ds Max

"My advice to students is to prepare their reel early while they are still studying. It is always good to have a blog of your work in progress or animation so when opportunity comes, you will be ready to send out your reel"

Skills used after going back to uni

• Acting for animation • Softimage • Maya • Match moving

"Currently, I am waiting to start work as a match mover at Double Negative Singapore. While doing that, I will continue to polish up my animation reel to better prepare myself as an animator in the industry"

Wrath of the Titans **is a recent project that Peter Claes has worked on at Method Studios – notably the sequence where Kronos wakes up**

© 2012 Warner Bros Pictures

> "[If] you end up going down a career path that you didn't intend, it's never too late to pick up those breadcrumbs and find your way back"

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Miki3 from Content Paradise. Circus props by Sixus 1 and Luke A, TerraDome by Runtime DNA.

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50 TIPS FOR BETTER CHARACTERS

Whether they're realistic, stylised or just plain out there, here's some advice to help you improve your CG characters

In many ways, character creation is one of the toughest elements of CG work. We all have a pretty good idea of what a human looks like, so even the smallest errors or inaccuracies will stand out as clear as day. To help you overcome these troubles, we talk to some of the top artists in the field of character creation to gather 50 tips and tricks that will help you instil your characters with personality!

Andrew Hickinbottom www.andrewhickinbottom.com
Alex Huguet www.metamesh.blogspot.co.uk
Arda Koyuncu www.ardakoyuncu.com
Carlos Ortega www.zigrafus.com.mx
Dmitry Cheremisin http://d33mon.cgsociety.org
Eric Spitler www.ericspitler.com
Jorge Lopes www.behance.net/jorgepepelife
José Alves da Silva www.artofjose.com
Luis Santos www.luissantos.net
Matej Hradsky http://matoh.cgsociety.org/gallery
Mohsen Fallah www.mohsen-fallah.cghub.com
Tiago Idalino www.tiagoart.com
Titouan Olive http://digitalia3d.teria.fr
Yang Guang www.blog.sina.com.cn/cgradiation
Zhang Chen http://zhangchendaxiao.cgsociety.org

© Andrew Hickinbottom

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Even with cartoon images, depicting the correct anatomy can be key: "I put the main bony landmarks of the arm in place – the epicondyles of the humerus, the olecranon and the styloid process of the ulna – then added muscles based on those landmarks," explains Spilter

© Eric Spitler

Getting started

Starting right is often the most crucial part of the process...

01 "Strive for originality. The 3D market is becoming quite saturated now [so] new ideas are hard to come by. Look for things for inspiration – your favourite cartoonists, real-life moments you experience, film, illustrations. Save any inspirational reference you find and keep a record of ideas that come to you." **Andrew Hickinbottom**

"Lighting is one of the biggest challenges," Olive says. "I usually render my images with mental ray. I often use an HDR Dome coupled with Final Gather. I also create traditional key and rim lights"

© Titouan Olive

02 "Create more than one sketch. I always start by sketching several of my ideas down on paper. I then choose the one I prefer. If you're using photo references then select them carefully – use images with a similar focal length, sharpness and exposure to what you wish to achieve." **Titouan Olive**

03 "Do research. To capture the essence of realism in your artwork, you must study what it is you want to create. For instance, if I'm texturing a character, I like to do a lot of research into the character's age and profession, and collect reference material accordingly." **Arda Koyuncu**

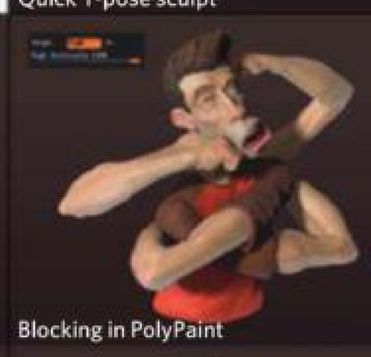
04 "You need to pay attention to detail. Decide your character's sex, age, physique, occupation and environment, and then collect reference information that will complement your character. They must be high-resolution images of excellent quality, with the right lighting and correct angle. You can find such images on 3D.sk or Google, or [shoot] them yourself with a model." **Dmitry Cheremisin**

05 "It's never a good idea to wing it. I have a full-length mirror where I work, so I can pose for myself. I start out small – maybe just working on the bust of a character, or even an arm, leg or torso study. You might also want to try posing one of the free models that comes with ZBrush rather than making one from scratch." **Eric Spitler**

Sketch

Quick T-pose sculpt

Retopologised in 3D-Coat

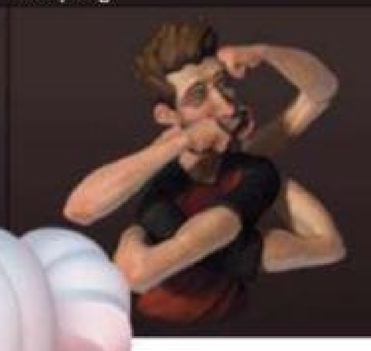


Blocking in PolyPaint

Transposing & DynaMeshing

Sculpting

Detailing in Photoshop



50 tips for better characters

+ Important first steps

Carlos Ortega talks us through the initial stages of this stunning image, The Weeping Woman

For Carlos, the very first thing he needs to consider – before even thinking about exploring poses or sketching ideas – is the back story of his image. He explains: "I always take into account the character's attitude, the emotions or feelings I want to convey and the background story, if any, of the character. Sometimes I even start thinking of the atmosphere I want for the final image. Thinking of the mood you want to convey helps you to narrow your options and speed up the process."

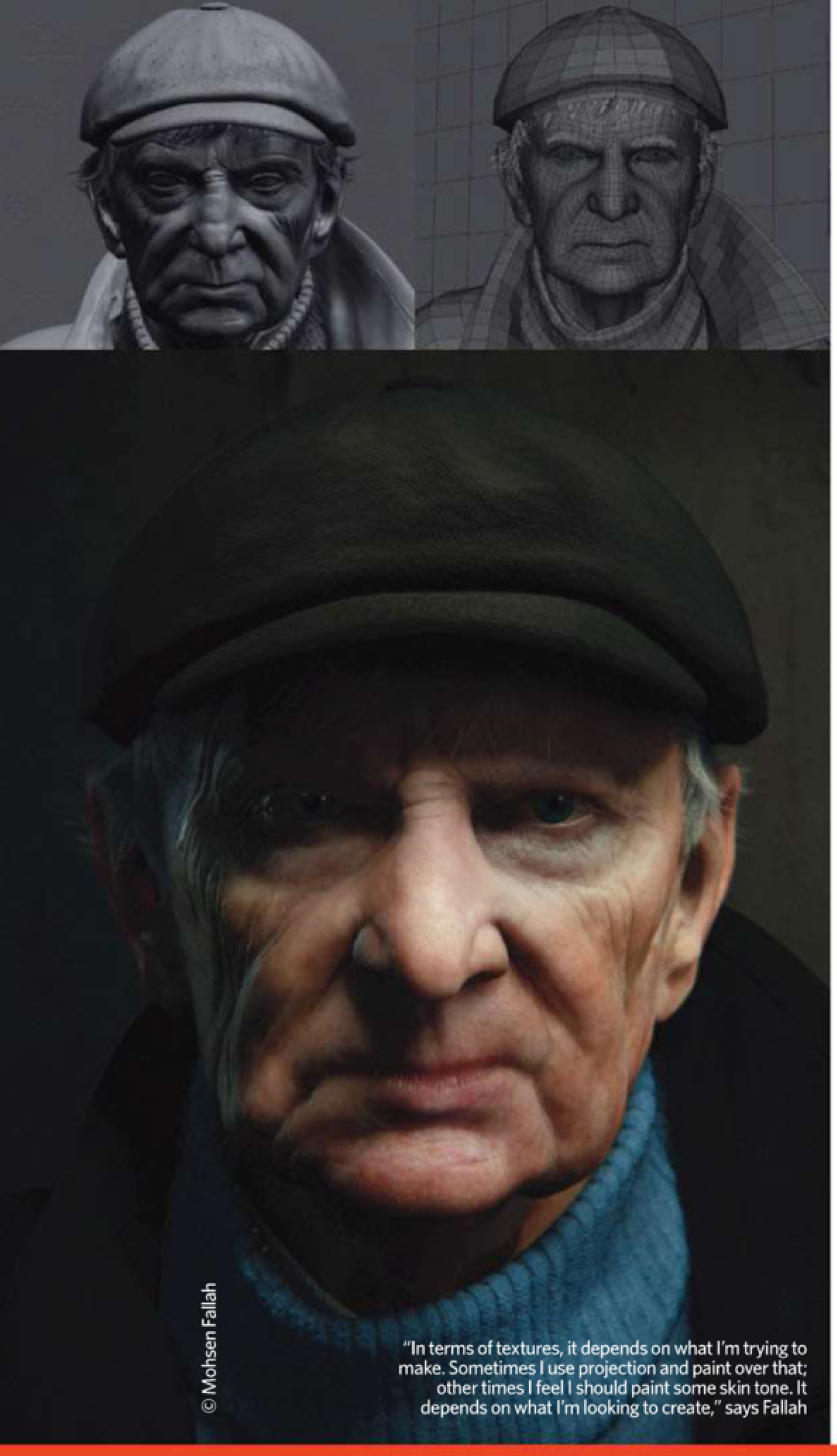
When it comes to posing, Carlos believes it's better to think about broad shapes rather than precise positioning. "I look for an attractive flow of shapes between the elements on the scene and balance whether it's a static or a moving pose," he says. "In a static pose it will avoid a stiff look in the character, and in a moving and dynamic pose it will tell the viewer where the elements are moving and where they come from in space. Always try to guide the viewer from one element to another."

Finally, as always, reference is key. "I suggest you use as many references as you can when starting out, as it helps you to learn how a body reacts and balances in different positions. [Whenever] I can I look for anatomical and artistic references, while taking a few moments to analyse what makes me feel comfortable or disturbed by looking at them. Most importantly, look outside for real-world reference at all times! The more info you have about how people react to movement, the more intuitive and fun it becomes to re-create those poses. Know their limits and even go beyond them!"

© Carlos Ortega

Ortega believes that real-world references still apply to cartoon characters as well as realistic ones, but you can push those limits to get even more attractive, graceful and believable poses

50 tips for better characters



"In terms of textures, it depends on what I'm trying to make. Sometimes I use projection and paint over that; other times I feel I should paint some skin tone. It depends on what I'm looking to create," says Fallah

© Mohsen Fallah

Pick the right software

Find the right tools that work for you

06 "My preferred software is ZBrush. It really offers you the freedom to create what you want. You can freely add or remove whatever you want, when you want. It's a lot like traditional sculpture in that sense." **Mohsen Fallah**

07 "It all depends on your experience with the software. I've used Maya and ZBrush for modelling, sculpting, shading, lighting and rendering for years, so I have no reason to change my tools. As reptology can be a really time-consuming process, I use tools like 3D-Coat [for that]." **Mohsen Fallah**

08 "I stylise my characters directly in Mudbox. I prefer to work with it because it's a straightforward piece of software. Its toolset and interface enable me to reach my goals in an intuitive and fast manner, meaning I have more freedom to experiment instead of having a painful experience of interface juggling. Find something that's comfortable for you in this way – that's what really matters." **Luis Santos**

09 "Most of the time I feel most comfortable modelling the base mesh in Maya and posing the model by adding a basic skeleton. It can serve as a dummy to explore silhouettes, store different poses on the timeline and block a good camera angle and focal length to keep a nice composition for the final frame before moving forward." **Carlos Ortega**

10 "For organic modelling, I prefer Maya over 3ds Max due to the Artisan tool and the easy setup of the Soft Selection. However, both are equally capable and the tools I use are quite basic – extrusions, brushes to paint and relax topology and so on. I tend to use Maya and 3ds Max for creating a base mesh to further sculpt in ZBrush and texture in Mudbox." **Alex Huguet**

11 "With each new release I'm finding it possible to do more of my work in ZBrush. I am experimenting with ZSphere rigging and having some positive results. If I'm creating a character that will need to be animated, I will sculpt my model in ZBrush in a base pose, then pose the mesh in 3ds Max and transfer all the sculpted details using Displacement or Normal maps." **Eric Spitler**

Expert stylisation

José Alves da Silva reveals the tools he uses to create his professional stylised characters

12 "Exaggeration is about giving more relevance/expression to parts of the character – broadening their shoulders to give information about their physical strength, for example, or modelling a high forehead to transmit intelligence."

13 "While modelling exaggeration, I mainly use the Move tool in ZBrush to redefine proportions. The Inflat tool is also good for expanding/contracting certain areas and testing their impact."

14 Simplification, meanwhile, is less about pronouncing elements and more about making their shape readable. "It's about transmitting the idea in a very clear way," says José. "I like to use curved lines versus straight, which contribute to a dynamic design for stylised characters. This will often lead to characters with sharper shapes than in reality. To achieve this sharper or harder-edged look, I tend to use the Polish, Flatten and Trim Dynamic brushes in ZBrush."

Exaggeration is a key tool when creating stylised characters. It helps create a pronounced image around the kind of personality you're looking to convey

© José Alves da Silva

50 tips for better characters

+ Modelling & posing

How the physicality of a good pose is just as important as your character's aesthetics

15 "When using Maya, set some basic image planes with some of your reference pictures to help with proportions. It's important to place those image planes in perspective views, not in orthogonal (front, side) views, because the perspective distortion will mean you will never get the model right." **Alex Huguet**

16 "Convincing character movement is incredibly important, from the bone movement limits to the way the muscle shape is formed by force and angles. Good anatomical knowledge is important in shaping a convincing sense of movement and selling the viewer on your premise." **Yang Guang**

17 "I model the base mesh in a neutral and slightly relaxed pose to keep control of proportions such as the limbs' length and body volume. Then I start exploring different positions. It helps me to try to re-create the same pose myself and see which things work and which don't. Yes, sometimes you'll look ridiculous, but that's one of the fun parts of the process!" **Carlos Ortega**

© Arda Koyuncu

"I avoid using too many or too few diffuse lights because they tend to make it more difficult to create believability," says Koyuncu

18 "Pushing and pulling on the mesh is important... once I have the base head geometry, I can make adjustments with Symmetry and Soft Selection, or even use ZBrush to re-proportion the model and experiment with looks, shapes and configurations. Once I'm happy, I clean up the image then add detail and definition." **Andrew Hickinbottom**

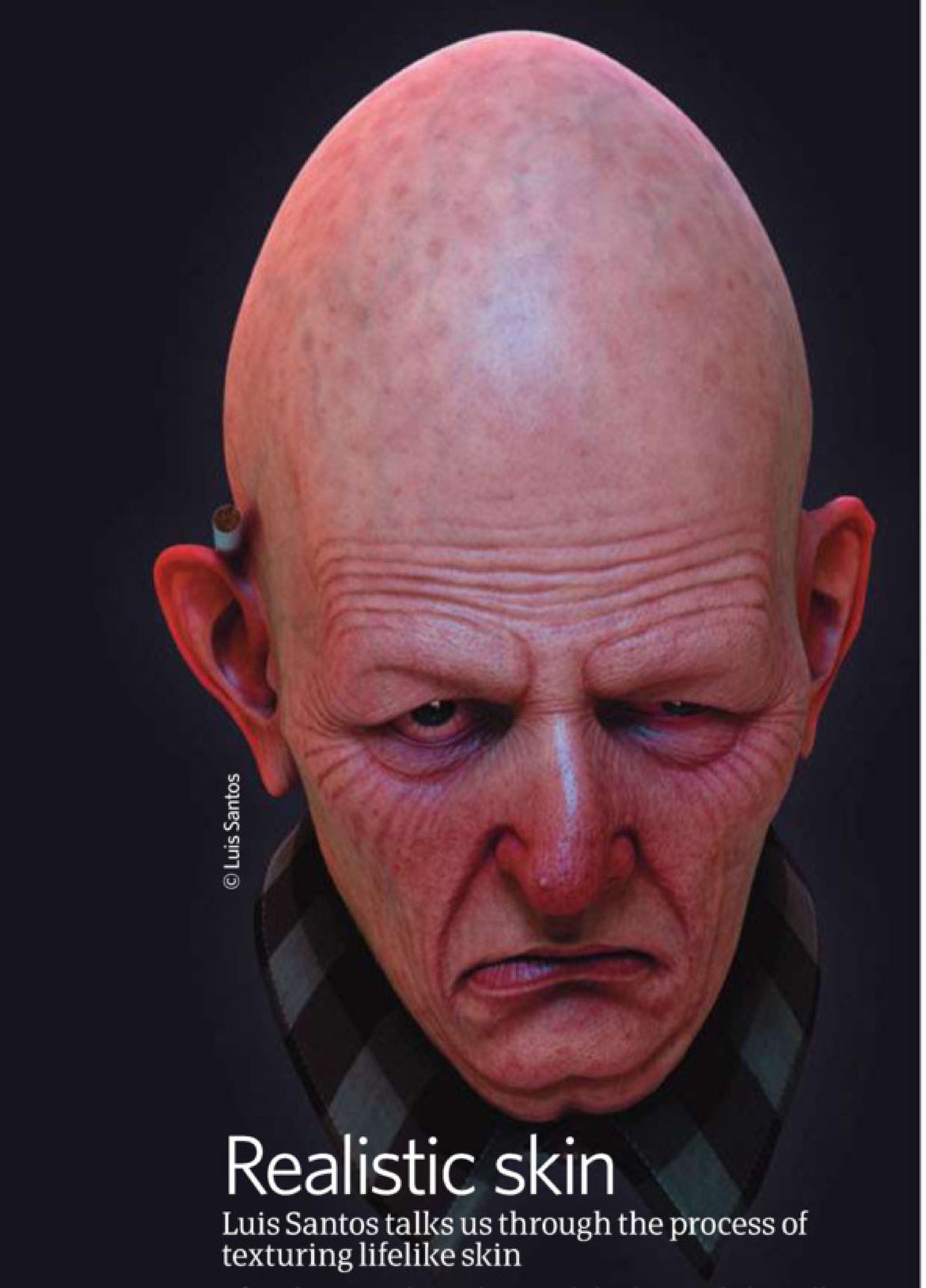
19 "What I like to do is create a highly detailed base geometry in 3ds Max. You can then put your mesh and your reference next to each other in Photoshop and match the proportions. Creating the final base geometry is important, because when you get into the rendering process your base geometry needs to hold up the overall shapes and retain the detail you sculpted via Displacement maps or something similar." **Arda Koyuncu**

20 "Exaggerating your character's features is important when adding personality and keeping away from a generic-looking character. You must balance such features if you want to achieve a rich character without going overboard, though... experiment to see what works, and keep in mind that there are such things as happy accidents – don't underestimate the power of chaos!" **Luis Santos**

21 "ZBrush has multiple tools that give you design flexibility: ZSpheres enable you to block a character's silhouette fast [and] DynaMesh opens the possibility of modelling the base of a concept without having to worry about polygon stretching or lack of polygons. The latest tools in ZBrush 4R4 even permit welding different geometry parts together... It also adds the QRemesher tool, which generates automatic topology." **Jose Alves da Silva**

22 "Once satisfied with a pose, start recovering the missing volumes and deformations the sculpting software can't re-create, such as the elbows and shoulders on a bending arm, or knees and hips on a bending leg, which are better to adjust separately without any Symmetry settings. Having constant details like this along the body helps to keep the piece at a certain level of stylisation." **Carlos Ortega**

23 "When I'm trying to finish up a pose I'll look at it from extreme angles that I haven't been paying attention to; I'll move the lights around in ZBrush and I'll squint my eyes to blur it. I'll often look at the pose upside down, and I find it very helpful to look at a mirror image of the pose. Looking at your work in these ways can help you to see it with fresh eyes and highlight some of the errors you couldn't see before." **Eric Spitler**



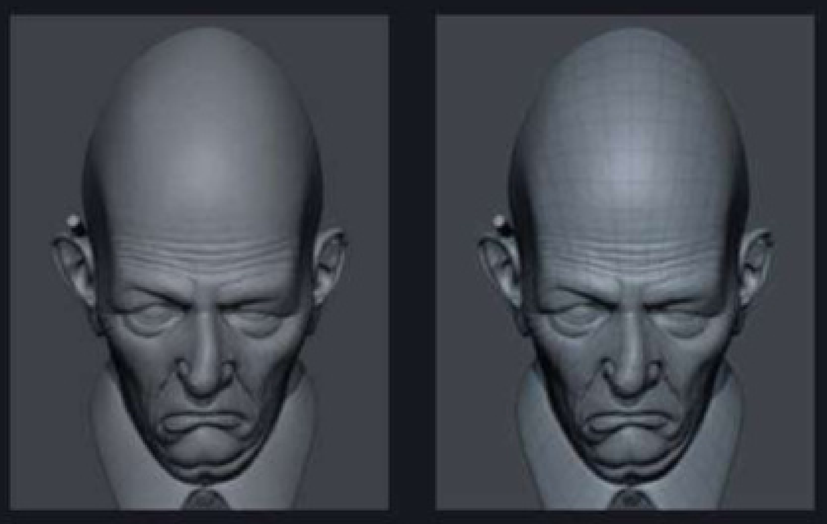
Realistic skin

Luis Santos talks us through the process of texturing lifelike skin

"If you have a traditional painterly background, this will definitely help with this process," says Luis of creating true-to-life skin textures. "Instead of relying only on photo sampling and projection, I prefer to manually paint on my characters. The results are unique and allow for stylisation.

"I start off with broad strokes of colour and gradually include smaller details," he continues. "Real skin is a stack of layers, so it makes sense to paint it accordingly. I paint several passes of layered skin tones and details while fiddling with different opacity values. Please avoid using Mirror, as it may kill your work's sense of authenticity, making it look dull and unrealistic in essence – remember, we are not truly symmetrical!"

When it comes to materials it all depends on the style you're aiming for: "Photorealism will lead you towards referenced materials, while illustrative works will often lead to rule bending," says Luis. "Sometimes, you'll be constrained by client requirements, [and] other times you'll have context considerations and sometimes – hopefully – it will be entirely up to your taste, and you'll be able to experiment in order to achieve the desired amount of stylisation in your textures!"



Santos uses Mudbox for his textures due to the software's ability to paint layered textures in a Photoshop-like manner while also being able to keep sculpting and texturing tied closely together

50 tips for better characters

Textures & materials

You won't be able to sell the audience on your character unless they believe in its appearance!

24 "Try to eliminate unnecessary steps in the process. For example, I sometimes won't UV my character, and will just use PolyPaint to texture in ZBrush. Sure, it will probably look better with a full set of textures and rendered in V-Ray, but sometimes taking too long on a project can see you can get tired and quit. I see so many artists start projects but never finish them!" **Eric Spitler**

25 "In terms of textures, it depends on what you're trying to make. I really like Photoshop and BodyPaint 3D, as I'm comfortable with them. I can use pretty big textures with many layers, simultaneously paint many channels, project different photos and paint over and over again until I'm happy." **Mohsen Fallah**

26 "When working with stylised characters, simplify! Having a cartoony character with photorealistic textures can look strange, so think about how you can stylise textures and reduce detail to complement the model's look. Many people opt for cel shading when producing cartoony images, which can look cheap if handled without reason and restraint." **Andrew Hickinbottom**

27 "Photoshop has a fabulous toolset to create painting brushes. Mastering brush creation is important when you paint textures by hand – which happens very often in stylised characters – as you can create brushes with specific purposes, like adding noise, dirt, texture, stitches, patterns and so on. You will be able to work much faster." **Jose Alves da Silva**

28 "I use ZBrush with PolyPaint to create the main tone and colour directly on my model. When this base is done, however, I use Photoshop for the finer details. I try to work with larger textures, as it's always possible to reduce the resolution later, but the opposite is not possible." **Titouan Olive**

29 "When creating Sub-Surface Scattering maps for realistic-looking characters, try to be as objective as you can. It's always really cool to add tons of SSS to your renders, but try to push it just to the right level – if you overdo it, it can be easy to end up with waxy-looking models." **Alex Huguet**

30 "If I'm trying to create a realistic character, I like to use texture projection to create a solid base. After I get a clean projection, I like to hand-paint on top of that to get more interesting colours and variety that fits with the character I am trying to create." **Arda Koyuncu**

31 "Materials play a big role in the stylisation of characters. You can force the specularity to create a more plastic look or exaggerate the reflections to get a shinier and visually appealing character. Toon shaders and materials that render lines at the character's edges create a cel-shaded look. By mixing regular materials with flat-shaded materials you can achieve a comic-style look. Your imagination is the only limit." **Jose Alves da Silva**

32 "When texturing, I use ZBrush to do the base painting and [create] the occlusion maps, cavity mask, diffuse and bump. I work with these maps in Photoshop, building the composition using photographs and a little painting. The tip here is to composite textures in Photoshop, along with cavity maps, photographs, and some hand-painting to give volume to the maps." **Tiago Idalino**

"If you don't have a good light setup it could ruin everything you've done up to that point. That said, a good lighting setup can also save a job that wasn't as successful earlier in the process," Idalino advises

50 tips for better characters

+ Light your characters

Why setting the scene is almost as vital as populating it

33 Light intensity will help pinpoint the parts of the character that you want the viewer to see first, and establish the path that their eyes follow when interpreting the image. Intensity and sharpness between light and shadow can also convey a darker or comic-book look, while softer lights establish a cuter or lighter look." **José Alves da Silva**

34 "When I'm doing stylised rendering I mainly use soft shadows and don't put too much contrast in the picture. Global illumination is my friend, and I like to use higher settings for the primary GI bounces. It also helps to use higher values for ambient occlusion and to add some warm colour to the lights." **Matej Hradsky**

35 "I light most of my work in mental ray with mr lights, but sometimes for pre-vis I use GPU-based renderers like FurryBall or Maya's Viewport 2.0. Even when they don't give you full physically accurate lighting, it saves me a lot of time by providing real-time feedback. Sometimes I start to light the scene at the same time I'm exploring poses with rough geometry, as it helps to plan my workflow and see what areas I need to take more care on." **Carlos Ortega**

36 "Be sure to study lighting in advance, just as if you were directing a photo shoot. Pay close attention to how lighting affects your specular, bump and other channels. If you're aiming for a stylised/cartoony look, you have more freedom regarding multiple light sources, straight separation between character and background, depth illusions and colour exaggerations." **Luis Santos**

37 "I always try to add a bit of contrast [to] the final render, a little rim light and so on – nothing too complicated. I tend to place a couple of V-Ray lights and play with the intensities, sizes and positions until I find what I'm looking for. I often do a lot of tests too, tweaking the lights and shaders to get the desired result – which can sometimes take longer than the modelling and texturing!" **Alex Huguet**

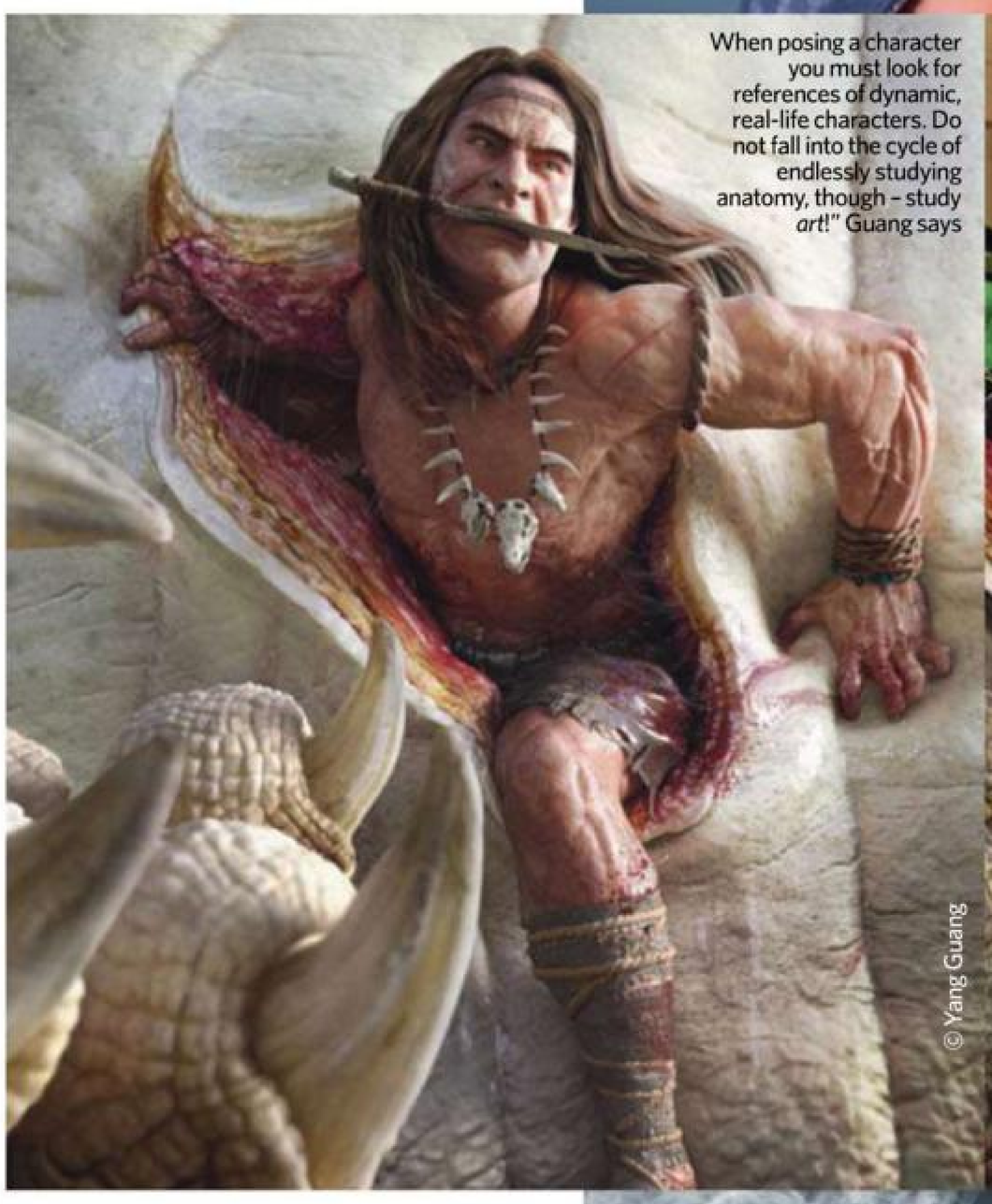
38 "Try to use soft shadows, as they look more realistic. Also pay attention to the work of professional photographers and how they set up their lighting. You can find a lot of information in books about photography. I often use VrayPhysicalCamera, as it has settings [like on a] real camera." **Dmitry Cheremisin**

39 "Depending on the mood of the piece, it's good to get nice, bright and clear lighting with some strong, sharp rim lights to show off the silhouette – providing your character design and pose has a strong silhouette to begin with. Weak lighting can ruin the impact of the characters, so it's best to think about whether you want soft or sharp lighting; dramatic or flat; bright or dim; warm or cold." **Andrew Hickinbottom**

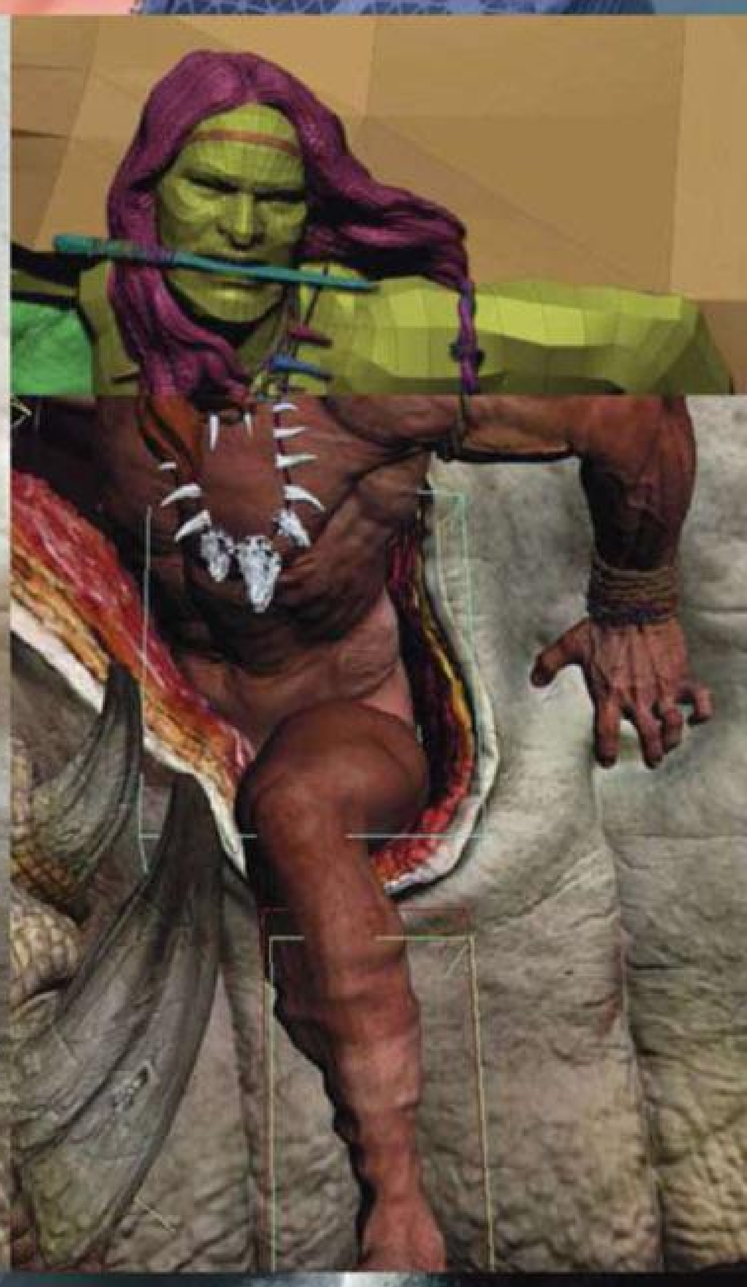
40 "A good light setup – such as the reliable three-point lighting – can give the viewer enough information to read the whole piece if it's for showcase purposes. For a different kind of feeling you can go for a more dramatic approach – varying light types, temperature and intensity will help to immerse the viewer in the character's atmosphere without losing its silhouette." **Carlos Ortega**

Cheremisin is a fan of MARI: "It's easy to implement the process of projective texturing, it allows you to create shaders and it contains a set of masks. The benefits are innumerable"

© Dmitry Cheremisin



When posing a character you must look for references of dynamic, real-life characters. Do not fall into the cycle of endlessly studying anatomy, though – study *art*!" Guang says



© Yang Guang

Lopes uses PolyPaint to create textures, which gives him a broad idea of what the finished image will look like before adding details in Photoshop

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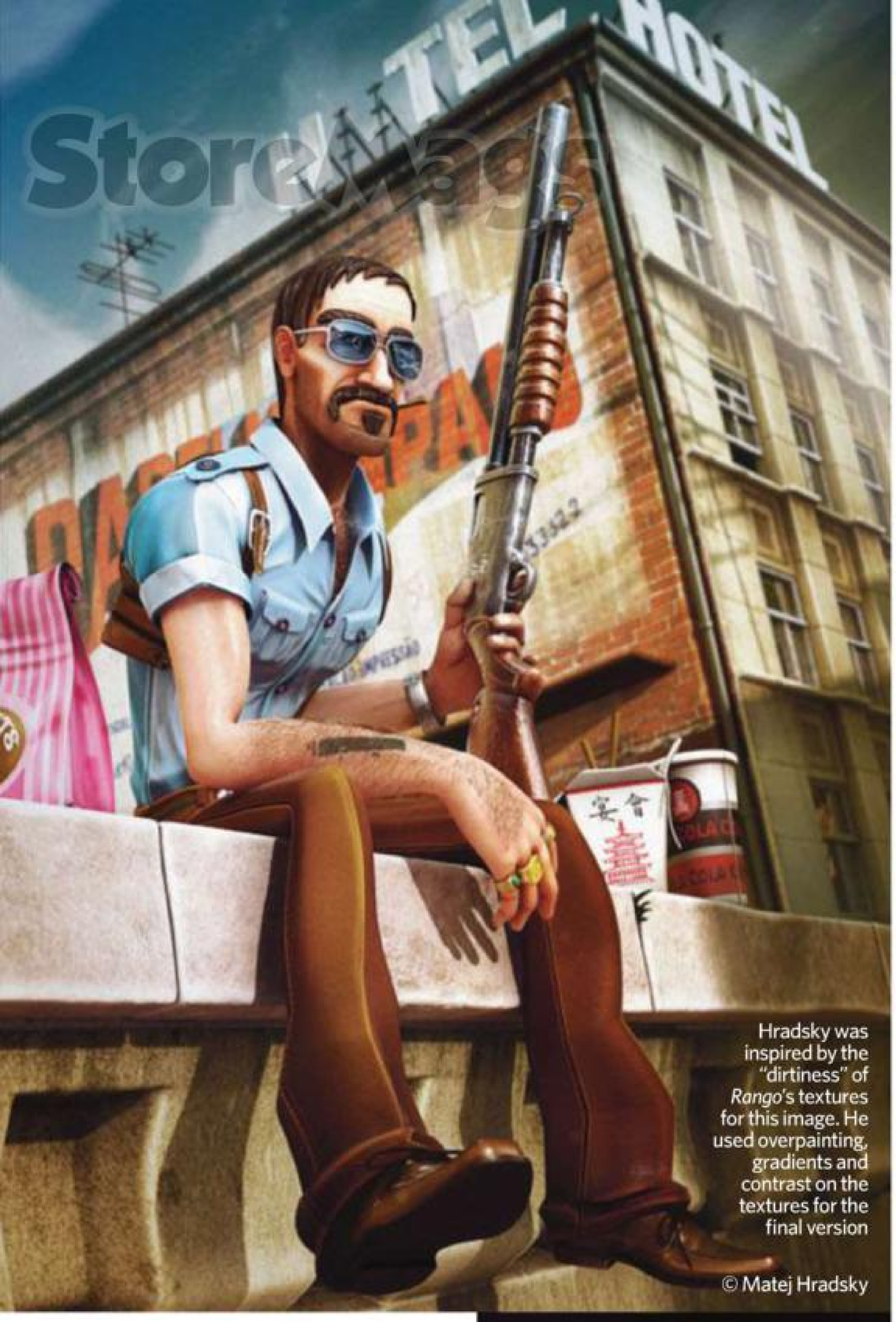


Hradsky was inspired by the "dirtiness" of *Rango*'s textures for this image. He used overpainting, gradients and contrast on the textures for the final version

© Matej Hradsky

"The Maya skin material is a priority in material selection... You need to spend a lot of time adjusting it and comparing it to other materials," advises Chen

© Zhang Chen

50 tips for better characters

Rendering advice

The final steps of the character-creation process can often be the most important

41 "For me, the most important V-Ray render element passes are VRay Diffuse, VRay Raw GI, VRay Raw Light, VRay Raw Reflect, VRay Raw Refract, Reflect Filter, VRay Refract Filter, VRay Specular, VRay Self Illumination and VRay Background. The final render is the sum of these different render elements (render passes). We can achieve the same result in Photoshop, like in the VRay Frame Buffer. For this, we just need to put all passes in Photoshop and set each layer to Linear Dodge (Add) – excluding the VRay Background (this must be Normal and below all other layers).

"GI (VRay Global Illumination) is a complex render element: we can take it from the Render Elements menu, or we can multiply VRay Diffuse with VRay Raw GI. The result will be the same. It's the same for the Light pass: just Multiply VRay Diffuse with VRay Raw Light.
Here's an example:

- **GI** = Diffuse*Raw GI
- **Light** = Diffuse*Raw Light
- **Reflect** = Raw Reflect*Reflect Filter
- **Final render** = GI (Diffuse*Raw GI) + Light (Diffuse*Raw Light) + Reflection (Reflect Filter*Raw Reflect) + Refraction (Refract Filter*Raw Refract) + Specular + Self illumination + Background."

Dmitry Cheremisin

42 "Render passes and render layers are really important when creating something special and realistic... I like using ambient occlusion, a Fresnel pass [with] fur, hair and shadows. Sometimes I prefer to render lights separately." **Mohsen Fallah**

43 "With stylised images, once everything is done I often try to put one more Diffuse pass on top of it all. With blending modes (in Photoshop), I play a little; using transparency/the Eraser gives a painted, cartoony feeling. I think it's good to play with ideas like this, as you can hope for a magical happy accident." **Matek Hradsky**

44 "I try to render major things in one pass and create masks for the different elements – like the character, the background, depth of field or the effects – so I can separate them or put them together later on in Photoshop." **Arda Koyuncu**

45 "I always render a Depth pass for atmospheric and lens-blur purposes. I use an Object ID pass to have enough masks to work with and to adjust colour values on individual objects. I add a Normal map pass if I need to re-light areas for composition or aesthetic purposes, and a Specular Reflection pass – just in case!" **Carlos Ortega**

46 "I render separate passes to save time if I need to make adjustments on materials or fix distracting artefacts without having to go back to render everything again. It gives you more control over the final image – not to mention the chance to create effects in post-production." **Carlos Ortega**

Quick rendering tips

José Alves da Silva offers four quick tips for rendering:

47 "I use render passes to force non-physically correct light situations (that look right) to enrich my images. For example, sometimes I'll want to emphasise a character's silhouette, even though he's against a wall... I create a separate pass of the rim light – without any shadows – that I can composite later with physically correct lights."

48 "Rendering specular highlights and self-illuminated objects in separate render passes is a trick I use to easily boost the highlights and create bloom/glow effects in post-production."

49 "I often render an Occlusion pass to enhance the connection between the various scene elements and help define the character form, using the Linear Burn blending mode with a low fill value to composite it with the original image."

50 "Importantly, I render a pass with masks that will enable me to easily select different objects in Photoshop and make colour corrections to each part of the image very quickly, then fine-tune the colour temperature, contrast and saturation."

Design and create an exosuit

Cricket Exo-Suit 2012

Explore the 3D and post-production workflow of this mechanical design, based on the aesthetic of the Roach Exo-Suit concept

Matthew Burke is a senior concept artist at id Software based in Richardson, Texas

Software used in this piece

3ds Max

Photoshop

With the Disc

- Tutorial screenshots

Learn how to

- Explore a concept in 3ds Max
- Use mental ray materials in your work
- Set up mental ray lighting
- Craft a high-poly design
- Layer renders in Photoshop
- Apply photo and texture overlays to your models
- Polish your image in post using Photoshop

behind the scenes

3D artists explain the techniques behind their amazing artwork

Artist info

Matthew Burke

3DArtistonline

Username: MBurke

Personal portfolio site
http://mburke.cghub.com

Country Texas, USA

Software used
3ds Max, Photoshop

Expertise Matt specialises in mechanical design and hard-surface modelling

storemags.com

Concept

I was asked to create a new exosuit to show my workflow when designing mechs in my Exosuit series. So my goal with this image is to apply similar elements and style to one of my other concepts: Roach Exo-Suit.

This tutorial will illustrate my personal process of concept design, using only the tools inside 3ds Max and Photoshop to create a mech exosuit model.

Throughout this tutorial you may find yourself asking 'Why didn't he just do that?', 'Wouldn't it make more sense to do this instead?' Well, gentle reader, if this proves to be the case, I recommend listening to your gut and following your instincts. My technique is a rat's nest of online tutorials, a jumble of advice from my peers, added to hours of desperate frustration. You don't need to travel in my exact path, but perhaps you'll find a kernel or two of wisdom from my unconventional experience. At the very least I hope you'll pull out a few tricks to apply to your own workflow.

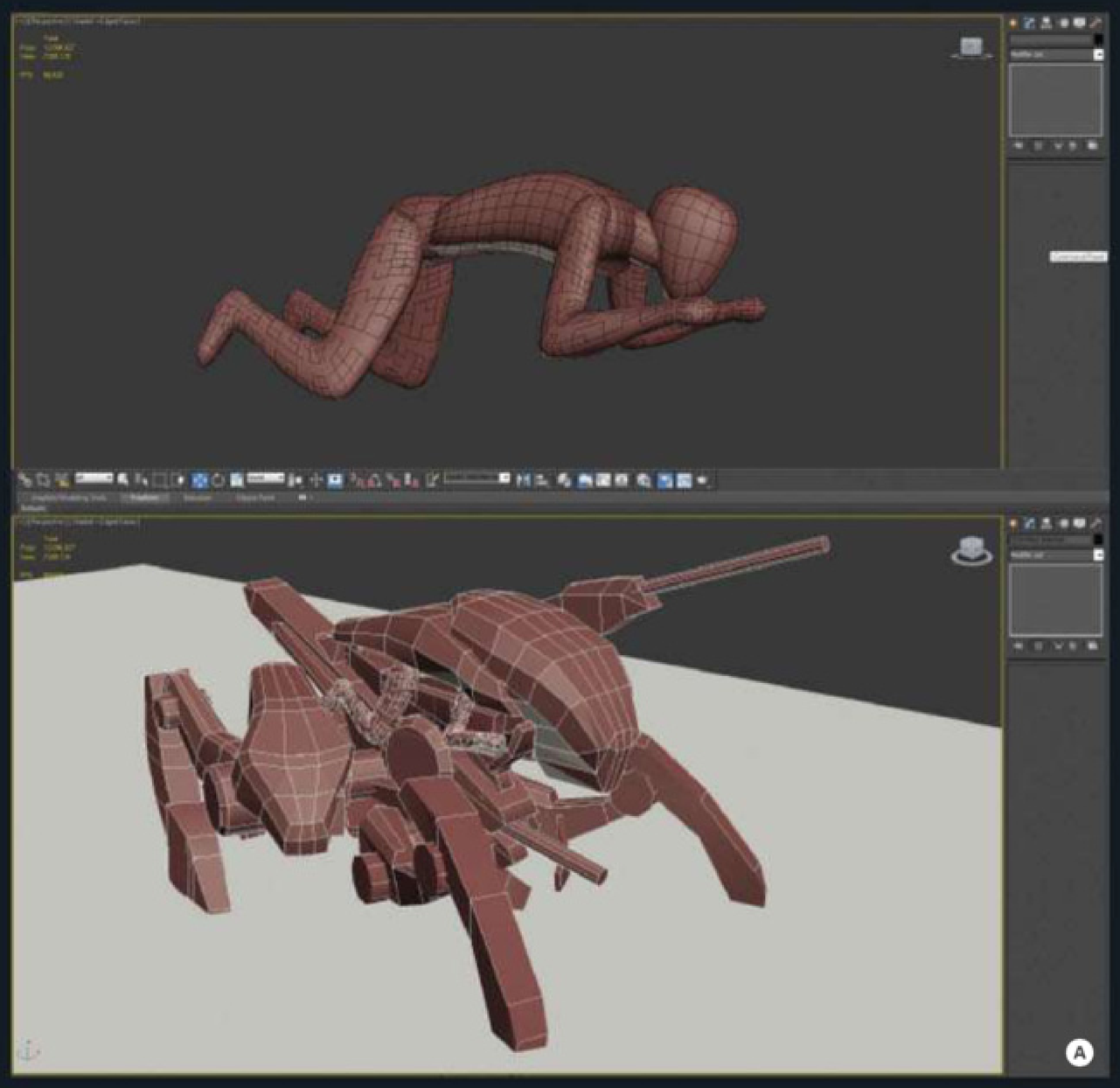
Essentially we will be tackling my personal favourite subject: designing a mech. We'll start with the rough-poly concept, move to detailing the model, apply some mental ray shaders, then tackle our lighting. From this point I'll be able to walk you through my post-production process in Photoshop and, with any luck, we'll end up with a killer concept. So let's get started!

Explore your ideas

Let's kick things off with the concept

01 The essence of low-poly designs

First of all we need a rough foundation, so we'll create a low-poly block-out of the mech design. However, before your pencil hits the paper, or you move a single polygon, you need to establish a general theme or idea to work from. Are we creating a lumbering, impregnable war machine or a nimble and agile mech? Is it fully automated or manned? How futuristic do we want to go? This example is a quadruped mech with some motorcycle overtones that would be able to climb rough terrain and fire on enemies from miles away, since it's not overly armoured Ⓐ.



Ⓐ Quickly rough out a low-poly concept to lay the foundations of your design

Artist Showcase

Matthew Burke

Matthew grew up in an incredibly small town in Iowa. Desperate for entertainment and a job outside of the agricultural industry, he turned to a career in art. After college he managed to land himself a concept artist role at a small studio and he has been successfully avoiding farming for 12 years now.

Roach Exosuit **3ds Max, Photoshop (2012)**
A manned combat exosuit designed to leap great distances and release an arsenal of weaponry on enemies. Here it's shown in an inactive stance

Roach Exosuit **3ds Max, Photoshop (2012)**
Here the same combat exosuit is presented in an action pose to showcase his arsenal of weapons and help get the idea of the mean machine across

B Establish your material foundations using mental ray settings and options in 3ds Max

C Apply your settings in the mental ray Daylight System to capture an initial lighting setup

02 Base materials and shaders

Convert your model to mental.ray.daylighting in your renderer presets and then create three to five base materials for your model. First, convert your standard materials to mental ray Arch and Design materials. Then apply an appropriate template for the aesthetic you are looking for: dark, dull metal; reflective, coloured metal; white metallic; chrome or coloured striping – you can always add more further down the line. For my base brown reflective material I have chosen to go with a Brushed Metal template with the Reflectivity at 0.9 and Glossiness at 0.86. Don't forget to turn on the Round Corners option in the Special Effects category B.

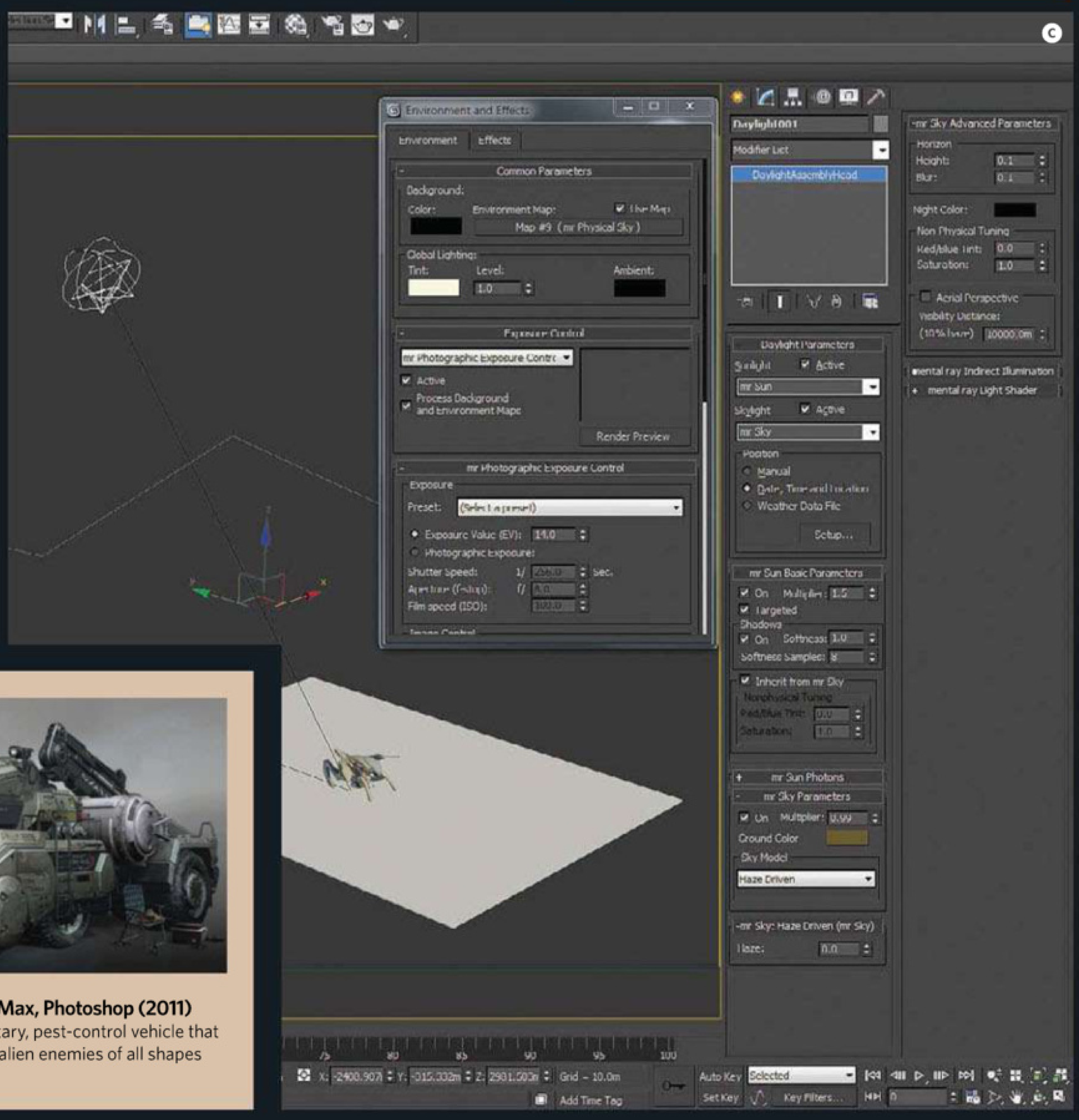
03 Lighting base

Now we need to create a mental ray Daylight System under Lights. After applying a generous ground compass, angle the DaylightAssemblyHead towards an area of interest on your mech. This will be adjusted later, but it will serve our purposes for test renders during our concept's development. If you know the environment your mech will appear in, you may want to adjust the ground colour accordingly under the mr Sky Parameters as well C.

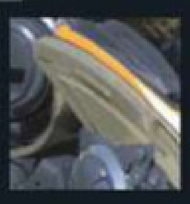
Balance form with function

As we start defining our design, keep in mind that a healthy balance of form and function is needed to inspire the imagination. To begin, I take one of the predominate shapes from the rough geometry and start working on its general shape. In this case I decide to begin with the contoured head of the mech. Focusing only on the form, I usually start a fresh piece of geometry and shape it into the general direction of the concept.

Once I have a solution, I apply a TurboSmooth filter to iron it out. Next I place an FFD (box) over the piece and, using the control points, begin to mould the object into something bold – but completely undetailed. From here I repeat another shape that I will lay over the original rough and form something that supports an interesting design. Now I have something with potential, I need to balance the form with some function. This means detailing parts and objects with a clearly defined purpose.



Sphinx Infestation Vehicle 3ds Max, Photoshop (2011)
Here we have a mighty, interplanetary, pest-control vehicle that has been designed to exterminate alien enemies of all shapes and sizes



Finalise the design

We can now finish the design and render out passes for post-production

04 Detail the ugly geometry

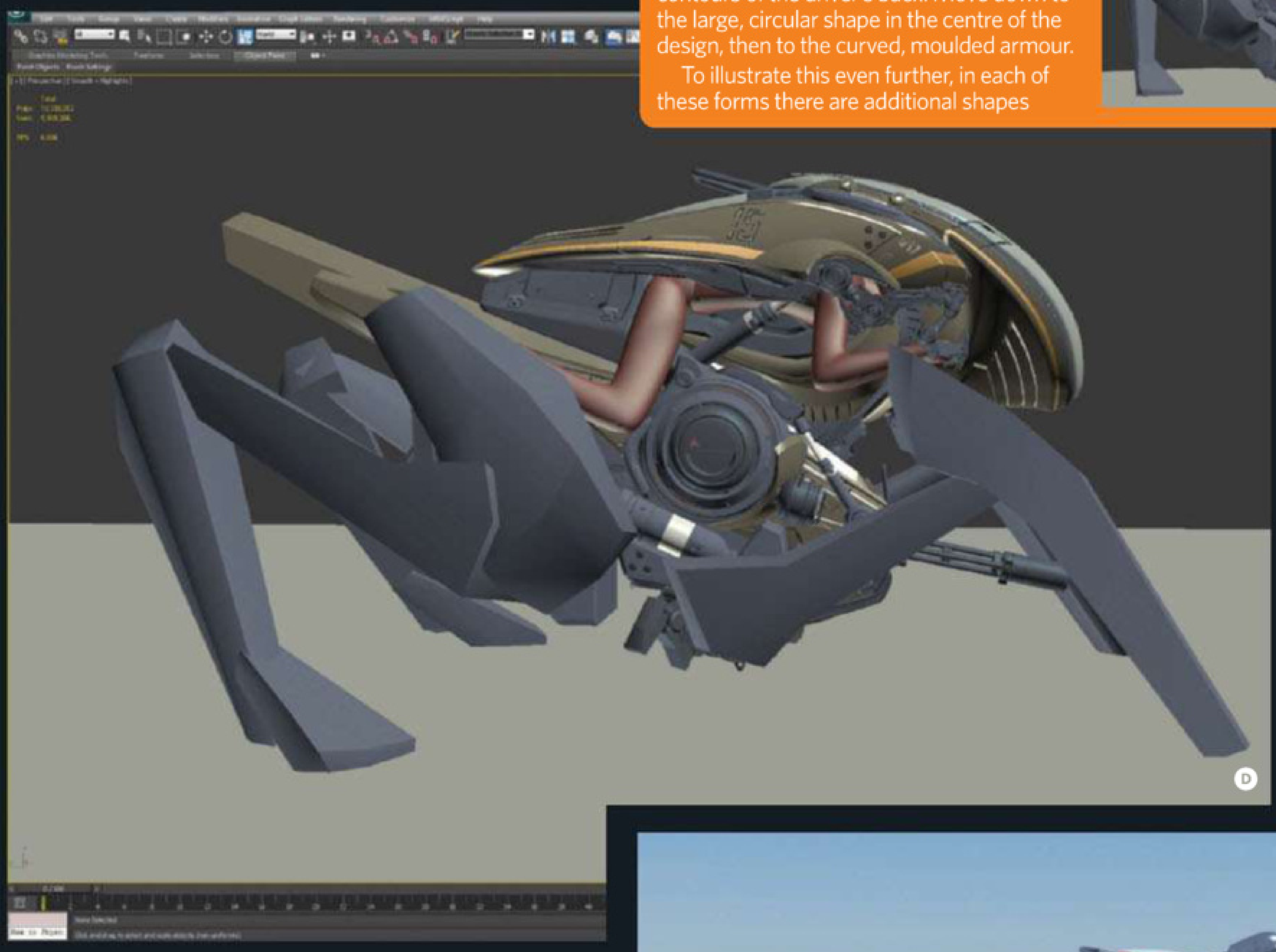
We've finally got to the part where we don't need to be embarrassed if someone looks over our shoulder, so let's detail the geometry! This is easily my favourite part of the process and where the concept really starts to develop. The most important things to keep in mind throughout this process is positive and negative space, and detail pacing. We want our silhouette to read clearly, and elements from the foreground, middleground and background to be easily readable. When detailing, remember to let the viewer's eyes rest in spots, keeping in mind that adding details without purpose quickly kills a composition. You want large areas of simplicity with small, intricate details in small pockets. In this case, our armoured casing is the rest area and the mechanical functionality is the detail (D).

Complementary details

The trick to successful detailing and design is guiding where and when the viewer's eyes will travel in the piece. Regardless of whether it's an epic environment painting, a character, or even a simple prop asset, having a clear read on the image's flow is often an overlooked step. Breaking a design into both form and function will help its readability; however, spacing the detail out in breathable areas is just as important. Complement the existing shapes and define a synchronised rhythm that enables a smooth transition from one area to the next.

Here I've tried to complement the rounded shapes of the mech's top with the contours of the driver's back. Move down to the large, circular shape in the centre of the design, then to the curved, moulded armour.

To illustrate this even further, in each of these forms there are additional shapes adjacent to them that suit their form. The hull on the top has an inset shape that conforms to the driver's shoulder. The operator's curves are mimicked in an almost mirror-like reflection in the padding shape under him. The large, circular engine has suitable forward-facing plating and the bottom piece is arched upwards to ease the viewer's eyes back into the composition.



D Define forms and functionality in your mech concept

E Our final geometry with shader materials and an initial lighting setup in place

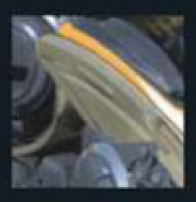
F Different passes at material renders

G Layer your render passes in Photoshop

H You can show off your details with the Poster Edges Filter

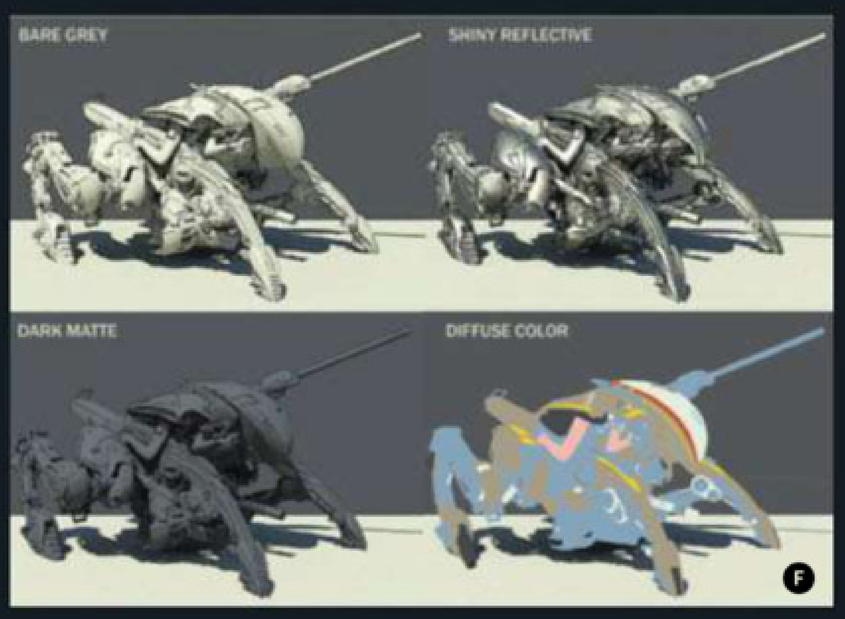
05 Conclude the geometry

The hardest part of this step is realising when enough is enough. Deciding what can be left for Photoshop, what to define and what is necessary to model is the difference between hitting a deadline or working long hours at the weekend. Have you noticed that our character model hasn't changed since the beginning of the tutorial? Photoshop will be able to handle this easily. At this stage we should have nice, unfaceted geometry and our shaders should all be applied to the appropriate areas. Once our lighting is finalised, we can pump out a big render and save the image as a 32-bit TGA file (E).



Rendering & post-production

Render out the design and bring it to life in Photoshop!

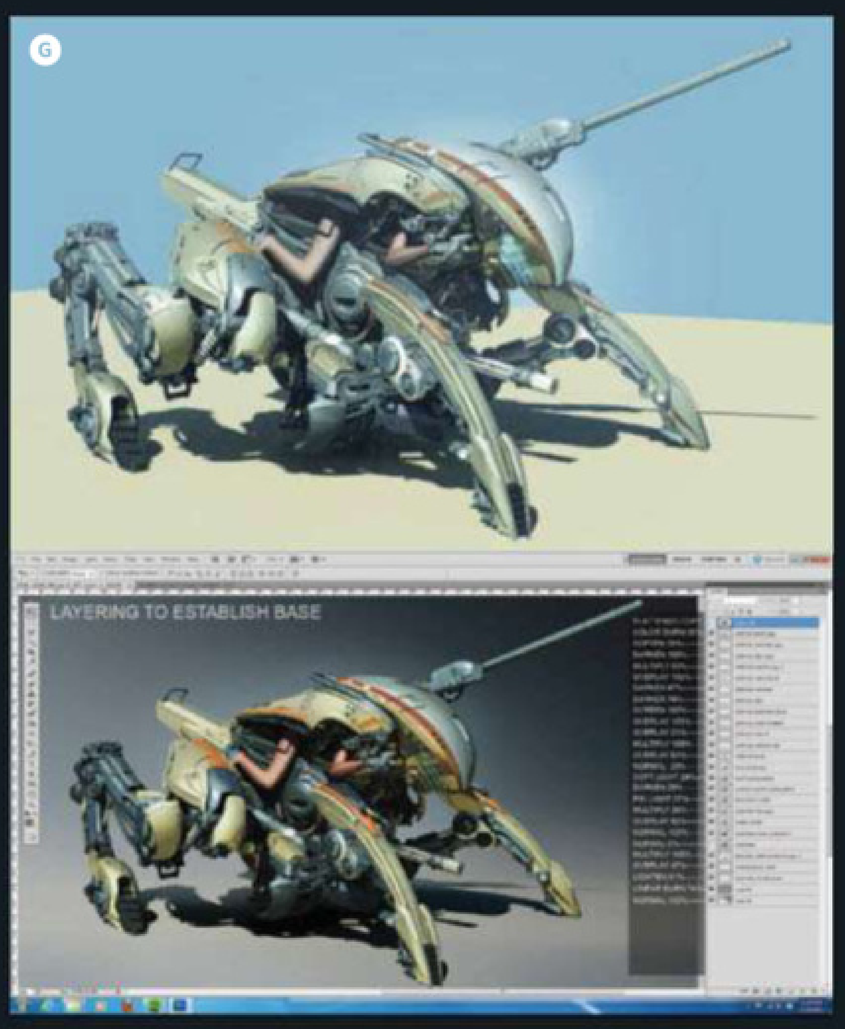


06 Make your render passes

From our fixed camera angle we will be rendering several different versions of our model. Aside from our original final geometry model, we will be rendering a base grey, a shiny reflective, a dark-grey matte and a bare diffuse colour pass. These will be layered on top of one another in Photoshop to give us control of all the aspects of our concept F.

07 Layer in Photoshop

Import all the TGA files into Photoshop and use Channels to select the ground plane with the shadow on its own layer. Render the TGAs into the scene and remove the mech from the background. Order your layers as follows: grey background; ground layer with shadow in layer one; the original fully coloured render in layer two; layer three is your shiny reflective with 100% Opacity in the Overlay option; next it's the dark matte for layer four at 35% in the Multiply option; and layer five is the shiny reflective again, but at 37% with the Pin Light option. Open the Diffuse layer on top and separate each colour into individual layers G.



08 Make those details pop

After adjusting all the layers to something that feels like a good starting point, grab only the mech in Photoshop and hit Shift+Cmd/Ctrl+C to bring all the layers into one layer. Once this is pasted into the top layer, go to your Filters tab and open Poster Edges in the Artistic channel. Change the Edge Thickness to 0 or 1, the Edge Intensity to 1 and the Posterization all the way to 6. Once these settings are applied, your details and line work will be far more pronounced. You may want to lower the Opacity on the layer to around 20-30%, so it doesn't overpower the image H.

Render setup tips

To begin, change your render presets to mental.ray.photometric.with.gl and load the default settings – make sure that all your mr Arch and Design materials are assigned to their selections. Create a Daylight System light in your scene, drag the compass out to cover the entire area, and then drag again to build the sun.

Go to your Common tab in the render setup and switch your Output Size to HDTV (video). Start small for your test draft renders but go large for final renders.

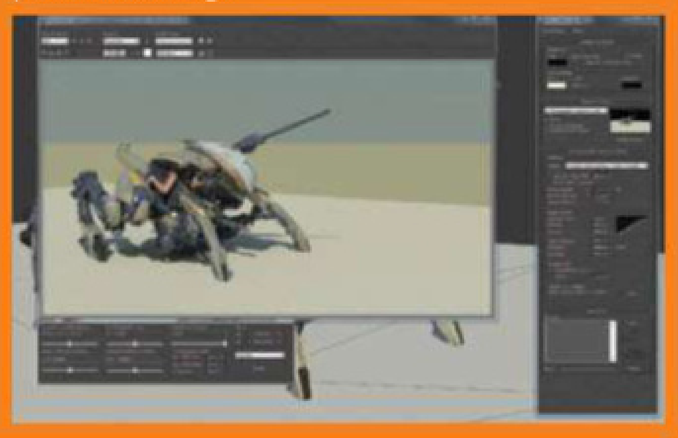
Go to Environment under the Rendering tab and change your Environment map to mr Physical Sky. Make sure your Exposure Control is on Photographic Exposure Control. Below that is the mr Photographic Exposure control, where you can switch the preset to Outdoor Lighting, Clear Sky.

Throw up a quick Render Preview under the Exposure Control tab and adjust the Exposure value to an appropriate setting. Under Image Control, adjust your highlights to a low setting – here I have set it at 0.02 – and tweak your shadows to a level that isn't overpowering (I chose to apply 0.79).

You'll want to toggle through your Midtones until you find a realistic value for your render (1.27, for me). Select your Daylight in the scene and change the Position to Date, Time and Location. Hit the Setup button followed by the Get Location button. Here we have a choice of locations all over the world: time of day and month of the year. This is a fantastic tool that, with some time-consuming experimentation, can give you fantastic results.

In my render I have decided to go with Seattle, Washington. This opens up the Control Parameters file and under Time I have chosen to go with Hours at 15 and Month at 1 (choose your own settings and adjust the hours to have control over your shadows and highlights, though). Now go back to your Daylight Parameters, change your Sunlight to mr Sun and your Skylight to mr Sky.

Finally, we can now adjust the ground colour to a low, saturated value. Be sure to hit Final Gather in your renderer. Now you can simply adjust the previous settings.



09 Material overlays in Photoshop

Using your Diffuse colour levels that have been separated into layers, you can apply a large photo material to each layer, giving it a new level of believability. Apply a low-level metal texture to appropriate areas, then scratches and dents in others. Adjust the levels and opacity of the layer until they are just right and you can barely even notice they're on the model. I get all of my photo reference from CGTextures.com – it's a resource that I can't recommend enough. Apply warning stickers, logos and even overlay some mechanical photos on areas that need some additional definition I.

10 Polish to perfection

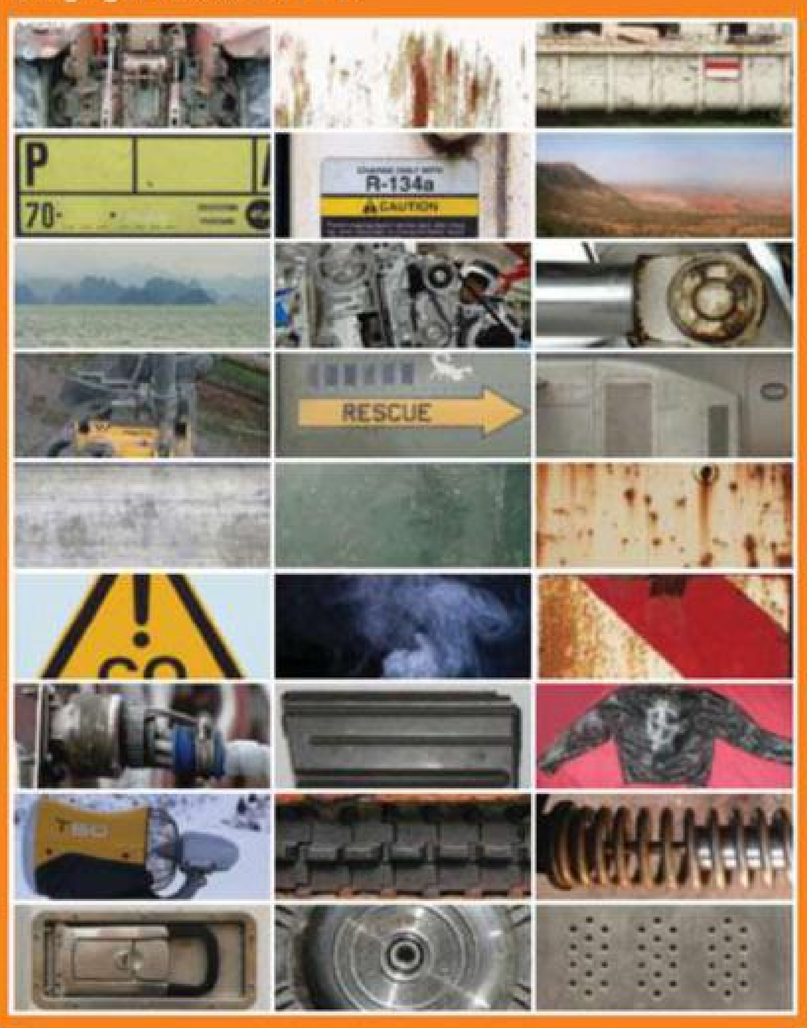
The concept is close to being wrapped up at this stage, so pick a complementary palette for the background that highlights and doesn't distract from the mech. Add some atmosphere and shadows to help push and pull the elements, then as a final stage add a blue-green Overlay layer at 25% Opacity over the top of the piece. This will help unify all the colours. Flatten the image then play with the Levels, Color Balance and throw in an additional Sharpen filter if needed J.

I You can help define a material's qualities with photo overlays

J The final concept complete with post-production edits

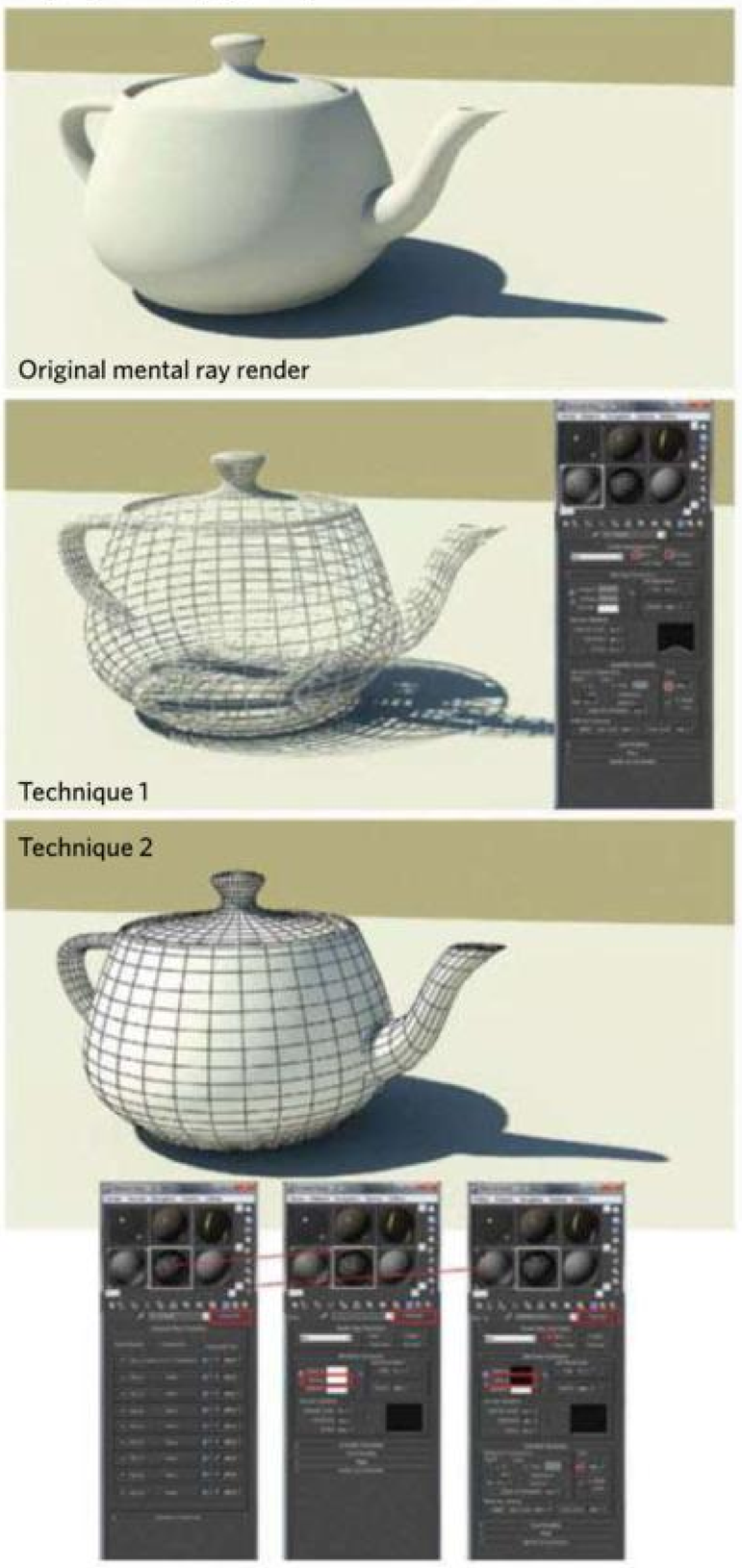
CGTextures.com finds

CGTextures.com hosts many wonderfully high-quality textures that can help you add detail to your artworks. Here is a selection of images that Matthew finds useful when bringing his exosuits to life!



Wireframe render tips for mental ray

There are a couple of ways you can create awesome-looking wireframes of your models to help spruce up your portfolio



TECHNIQUE 1: The first technique is incredibly simple: just select a Standard material of your choosing and apply it to the entire model. Under Shader Basic Parameters check the Wire and 2-Sided boxes. Then, in the Extended Parameters channel, adjust the thickness of your wire to your preference. A friendly warning: this is extremely taxing on most computers so try to apply it to your model just prior to your render.

TECHNIQUE 2: The alternative method just requires a few additional steps. Select a material and change it from a Standard to a Composite shader. The preset setting for the base material is a Standard material and its colour will define your mass area in the render. In this case I've changed its Diffuse to a solid white colour.

Go back to your original parent group and select your Material #1, just below the Base Material. Click on the Channel box and keep it a Standard material. This material will define the Wireframe Overlay. In this example I have used a solid black in the Diffuse colour. Next, check the Wire selection and then down below in the Extended Parameters channel adjust the thickness of your wire. For this *amazing* teapot I have it set at 3.

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Model perfect assets in Rhino

Space JL10 by Republic of Fritz Hansen™ - NURBS model 2012

> It's not always possible to find a free or commercial model that's detailed enough for your demanding arch-vis projects. Build your own library of assets for use time and time again!

Matúš Nedecký is an arch-vis artist from Slovakia

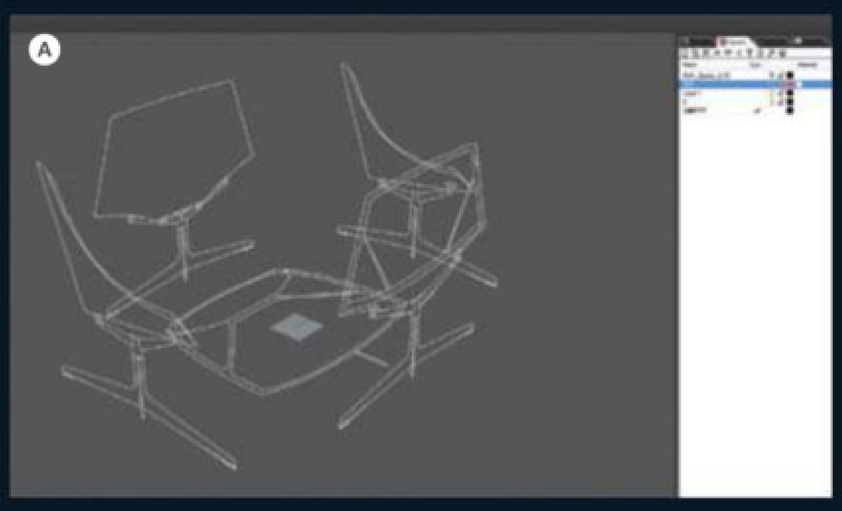
Great furniture is perhaps the most important accessory in your interior visualisations. It's hard to find free 3D models or commercial solutions that will bring the quality needed for detailed shots. For this reason I decided to conduct my own research into how far we can go with realistic results when creating furniture in 3D.

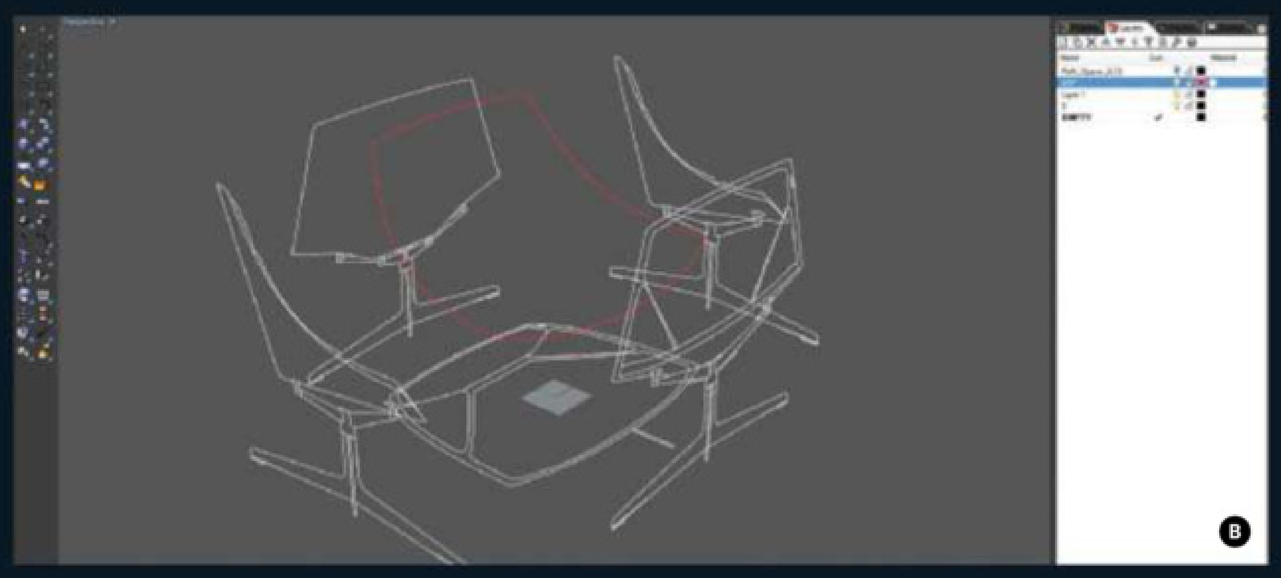
Rhino is a NURBS modelling tool that is known for its accuracy in geometry. This is precisely why it's so widely used in the design and automotive industries. It's perhaps less well-known in arch vis, though. So why have I decided to use it in my work on a daily basis? It's simple: because of the program's smoothness and user-friendly interface. It's not overloaded with unnecessary functions and is very stable as a modelling tool.

Learn the CAD basics

Find source data for accurate modelling

01 Get to know CAD To begin, we need to find accurate CAD data, which for this project can be downloaded from the official Republic of Fritz Hansen™'s website (www.fritzhansen.com/en/space-jl10-lounge-chair – look for the 2D DWG FILES link in the sidebar). Importing the DWG file is drag-and-drop. Position separate views in the 3D space (curves are automatically grouped on import) and you're ready to start modelling. You can download a fully functioning evaluation trial from http://tinyurl.com/rhino3da – it's the same as the commercial version except it only saves 25 times (A).





02 Perfect curves You can create organic surfaces in many ways, but it's always vital to have border curves and be precise. Start from the Right/Left view with the Planar option on, so the new curves will be created at the CPlane level. Show the control points by pressing F10 and use Gumball to move each of them, checking their position in Front and Perspective views. When the curves are in place, use the Mirror option and join them together (B).

03 Prepare for surfaces The next step is to create the section curves, so that the surface you create later will be as accurate as possible. You can even build simple lines starting and ending on the border curve (opposite positions). By rebuilding them you can easily adjust their shape with more control points. The more section curves you create, the more accurate your surface will be. In this case we will basically need two curves – horizontal and vertical sections – and optionally one more vertical section, which might be mirrored around the CPlane (C).

(A) Importing CAD data is as easy as dragging and dropping the file into the running Rhino session

(B) You can track the actual chair outline shape with the new curve

(C) You can create as many section curves as you want

Learn how to

- Work with NURBS surfaces
- Make smooth cushions
- Work polygon-free
- Add small but essential details to your scene

With the Disc

- Find Matúš' tutorial screenshots for better viewing

Software used in this piece

Rhino V-Ray Photoshop

Download a fully functioning Rhino trial at http://tinyurl.com/rhino3da

behind the scenes

3D artists explain the techniques behind their amazing artwork

Concept

The original design referenced in this tutorial is a unique concept by the Republic of Fritz Hansen™. The company's website has a fantastic image library that users can download images from to use for their own purposes – providing they credit the copyright owner, of course. The Republic of Fritz Hansen™ has kindly given us special permissions to use this particular chair design for the purposes of our tutorial. Head to **www.fritzhansen.com** to discover more beautiful designs!

Original concept © Republic of Fritz Hansen™. www.fritzhansen.com

Artist info

Matúš Nedecký

3DArtist online

Username: matus.nedecky

Personal portfolio site
www.flyingarchitecture.com

Country Czech Republic

Software used
Rhino, V-Ray, Photoshop

Expertise Architectural visualisation and matte painting for architectural environments

Artist showcase

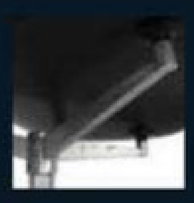
Matúš Nedecký

Matúš is a 24-year-old artist from Slovakia currently working in the architectural-visualisation industry in the Czech Republic. While it's hard to find artists professionally working with NURBS, as Matúš does, it's his love for his work and the software he uses that encourages those around him to learn from his skills and workflow.

Norway House **Rhino, V-Ray, Photoshop (2012)**
As an architect, Matúš loves to express himself through design. This is one of his dream houses pictured in a late-dusk atmosphere in Norway – something he'd love to experience in person

Aluminium House **Rhino, V-Ray, Photoshop (2012)**
Another spare-time project. It's important for Matúš to make these quick, personal projects in the breaks between his secret commercial projects, so he has something to fill his portfolio

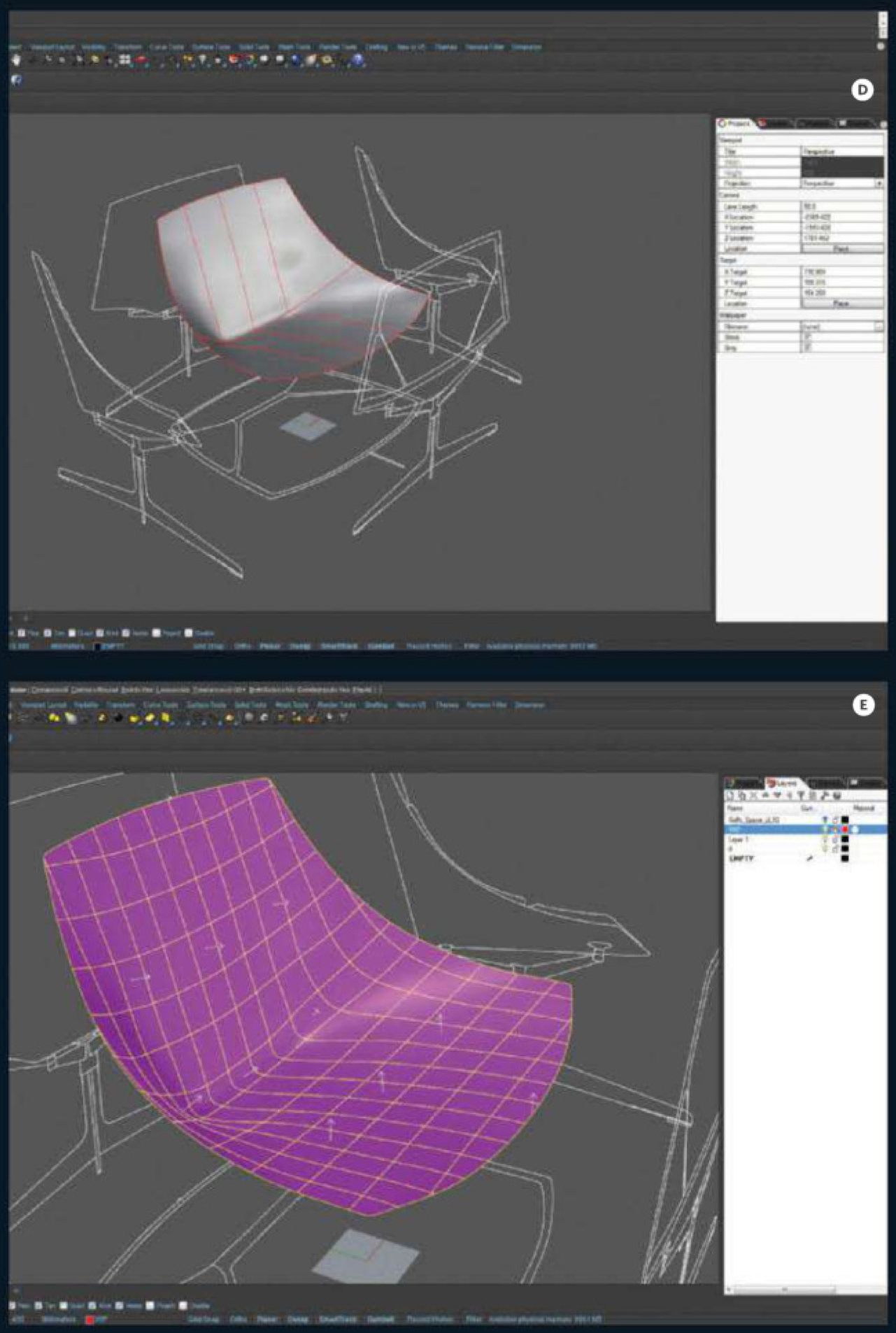
Sleep Units **Rhino, V-Ray, Photoshop (2011)**
Part of Matúš' undergraduate degree project contained a concept of a sleep unit for students, suitable for any space such as industrial interiors or rooftops. Every unit contains a bed, desk and library



Model plastic seating

Introducing surfaces and polysurfaces

04 **Start with your initial surface** Select the border and section curves you created in the last step and use the Patch tool (found under the Surface menu) to create your first surface. Pressing F10 will show the Control Points Network for the surface, which can be used to refine the selected surface shape Ⓓ.

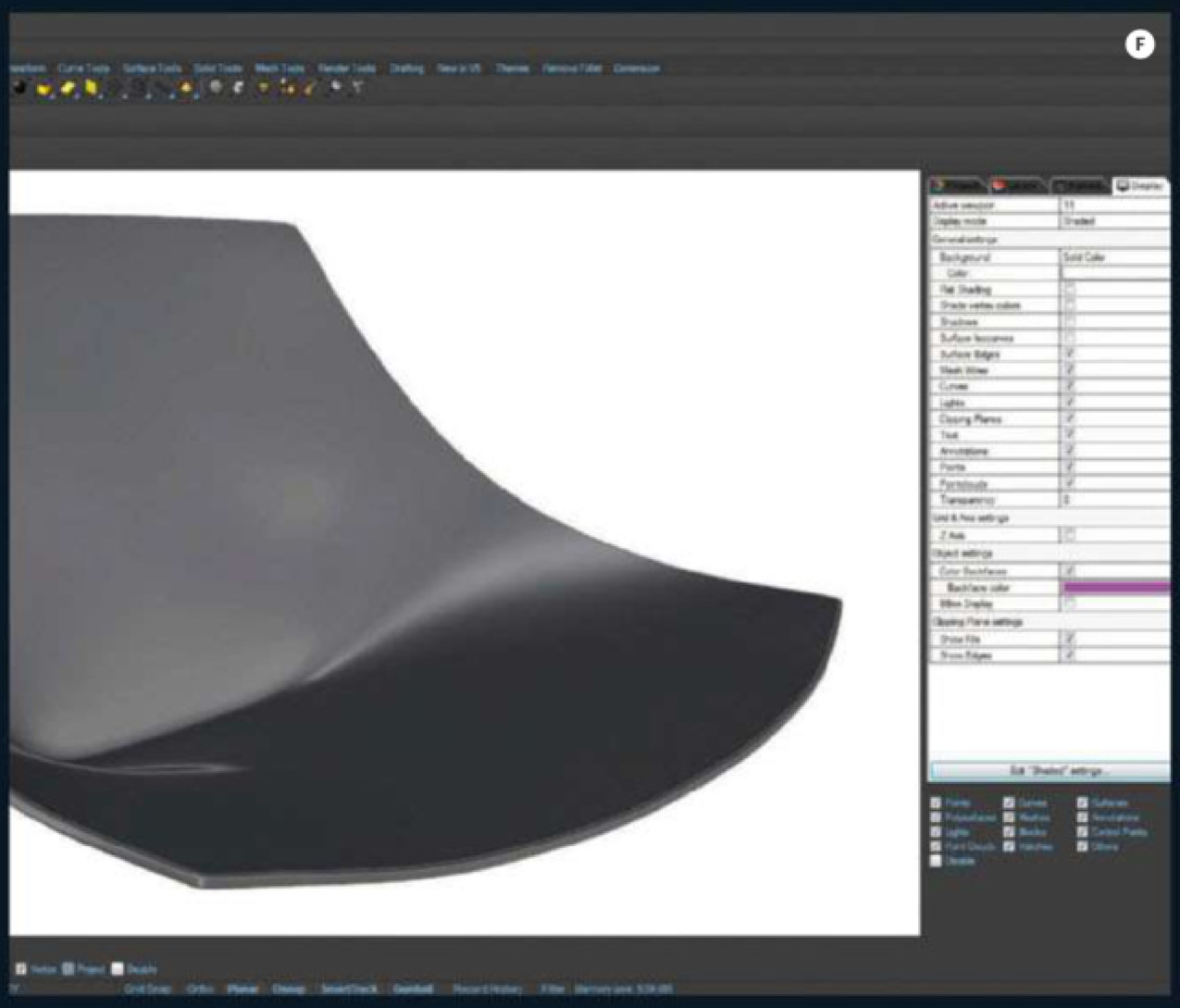


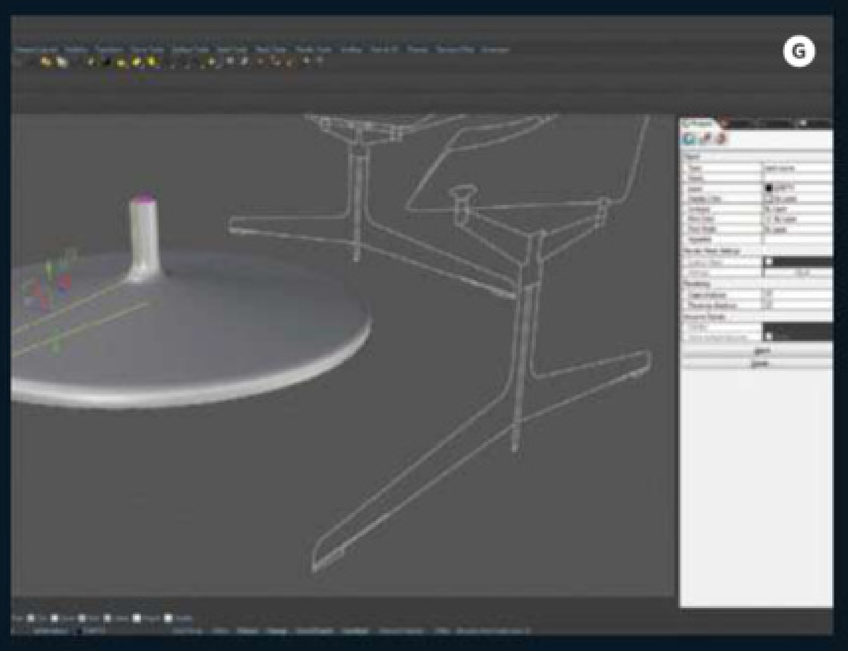
05 **Adjust the surface thickness** Select the surface and use the OffsetSrf command to create a solid (known as the Shell modifier in 3ds Max). This command gives you good control over the final result. You can select the surface's Thickness, choosing between Solid/Simple surface offset, its corner type – and also take a look at some of the other options. Make sure to choose 9mm as the Distance and turn on the Solid option as well, for the Thickness of the Simple surface Ⓔ.

Ⓓ The Patch tool fills out any holes or curves

Ⓔ Pink backfaces are really irritating, so I tend to set them as a general backface colour, just to make sure my models are always correct

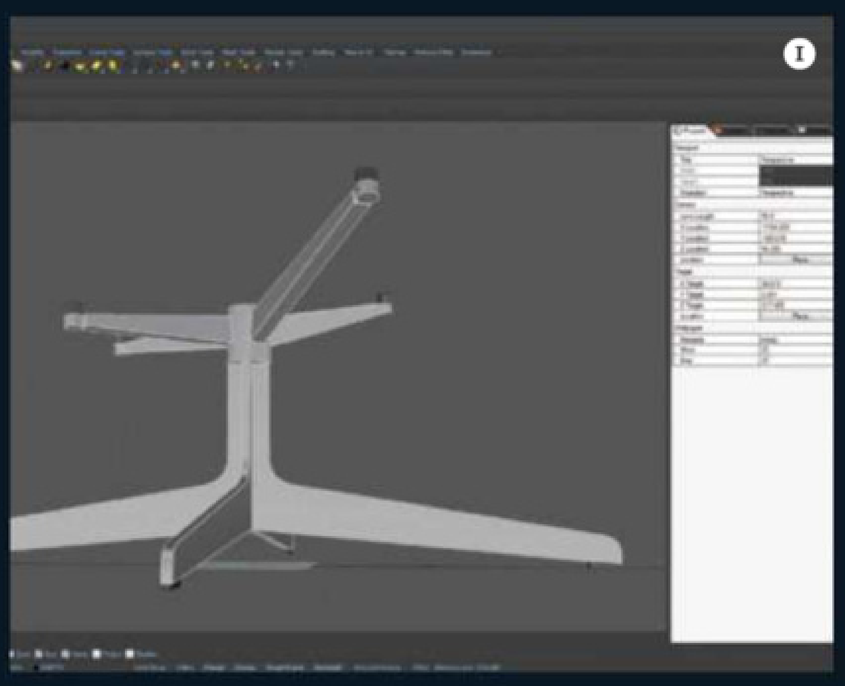
06 Smooth the model edges The problem with many 3D models used in interior visualisations is their hardness and sharp edges, but we can fix this very easily in Rhino. To make edges nice and smooth, use the Fillet Edge command from the Solid menu, select both edges of the polysurface and fillet them with a Radius of 3mm. The best aspect of applying the Fillet Edge is that you can use varying radiuses for unique results. Random spots can also be filleted differently, creating some interesting details and ensuring the 3D model isn't too perfect or artificial-looking (F).

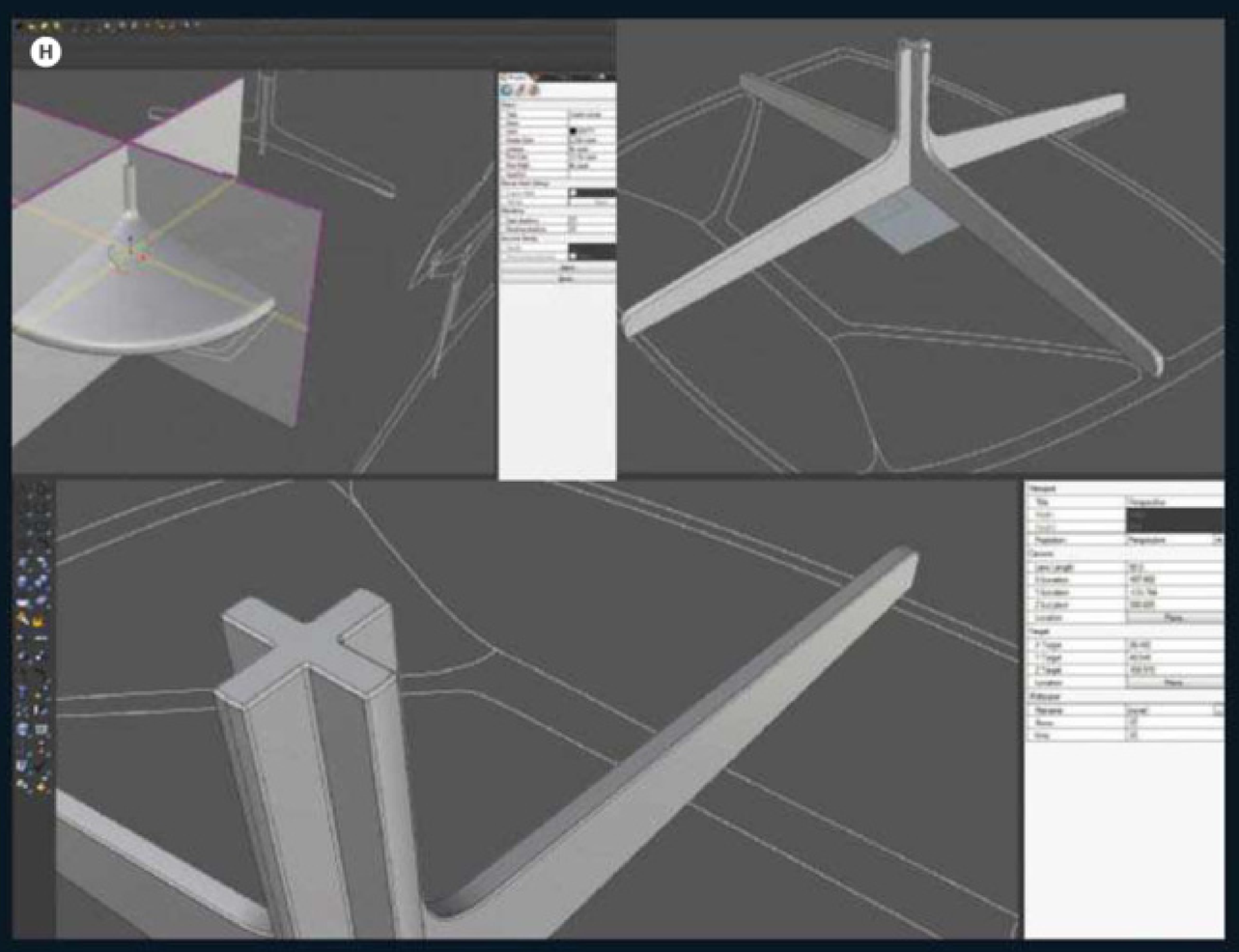




07 Model basic shapes For quick and smooth filleting without gaps and holes in the geometry – as well as to get the geometry as simple as possible – we're going to use a slightly different method than what might be expected for this kind of object. Create a curve describing the leg shape in the Front/Side view, making sure it starts and ends on the CPlane. Use the Revolve command to rotate the shape all over the object (G).

08 Extract the legs Extract the outline of the legs from the Top view of the imported CAD file and use the Extrude command to create polysurfaces. These will be used to cut the legs out of the revolved surface. Using the Split command you can easily separate both sets of surfaces to extract the final shape of the legs. Select what remains and join them to a closed polysurface. The Fillet Edge command will make these edges nice and smooth (H).





09 Detail the chair leg We can now test using basic primitives – boxes and cylinders – following the previously described steps to achieve the desired look. At this stage we can also add a new tool to our workflow. Using the Boolean Union tool in the Solid Tools panel, you can join the spine of the legs and the profiles holding the seat (I).

Complicated NURBS topology

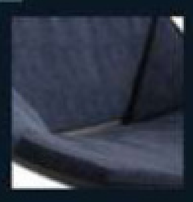
With Rhino 4 (which featured no UV mapping) it was important to keep surfaces simple – not polysurfaces that were very complicated to map. Since there is a UV-mapping widget in Rhino 5, even for NURBS surfaces, you can make complex objects fully in NURBS and keep mapping simple. However, always be sure to keep surfaces and polysurfaces as simple as possible, for better handling inside your scenes.

(F) Hard and sharp edges are often an issue with interior 3D models, so avoid this with the Fillet Edge

(G) We can get very simple topology for upcoming trimming/cutting work

(H) Create section planes, split the disc and fillet edges to get the detail

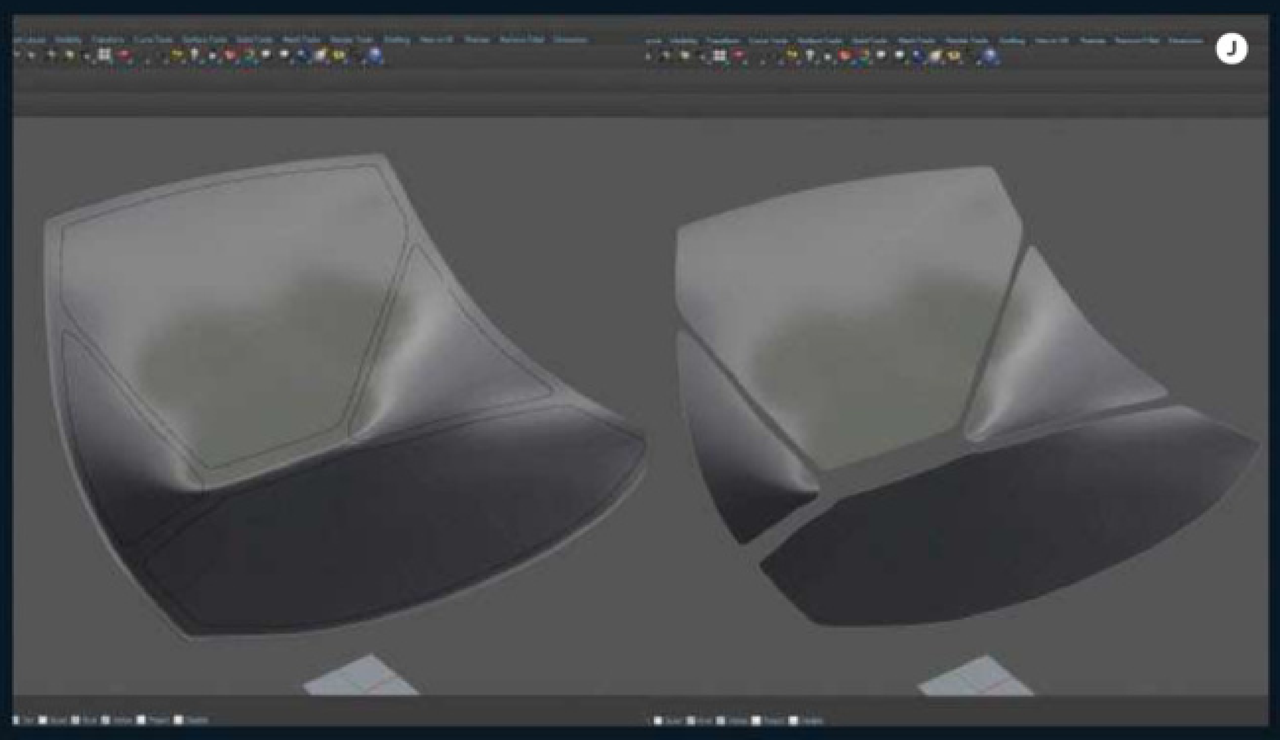
(I) Booleans work perfectly with NURBS geometry – unlike polygons found in other 3D software



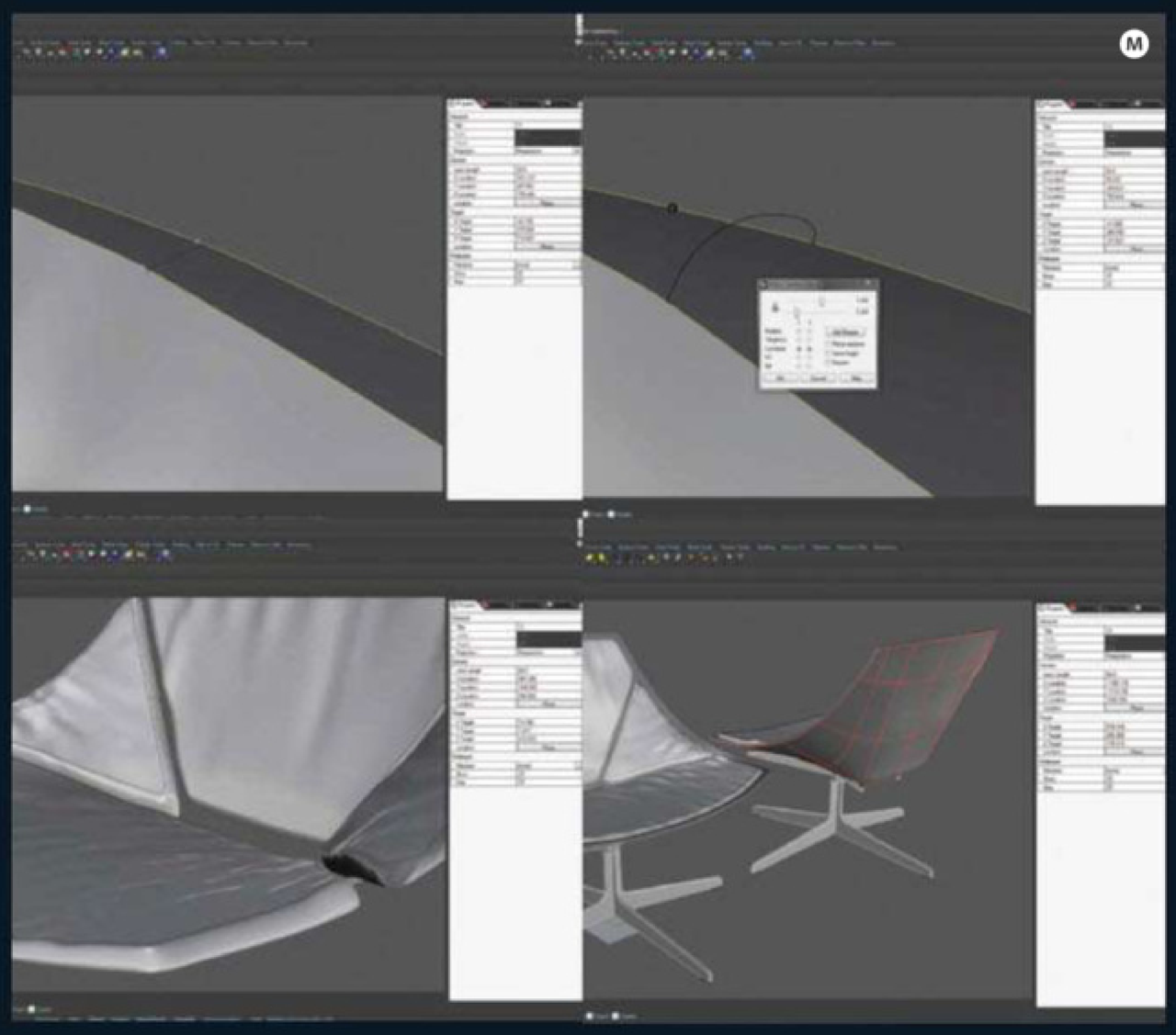
Get smooth results

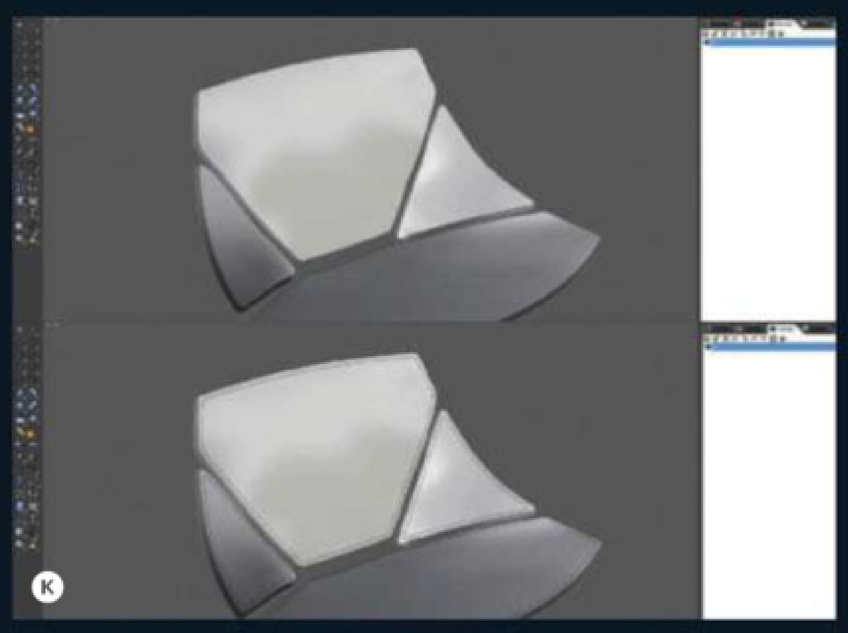
Begin to offset, rebuild and blend

10 Interpolating curves Select the seat object, duplicate it, invert the selection and hide it. It's easier to work with an isolated object in the scene than with all the curves and surfaces around. Go to Curve>Freeform>Interpolate on Surface, select the inner-surface of the seat and draw borders for the cushions. Curves will be interpolated on the surface, so you can split and delete everything except the bases for your padded elements (J).

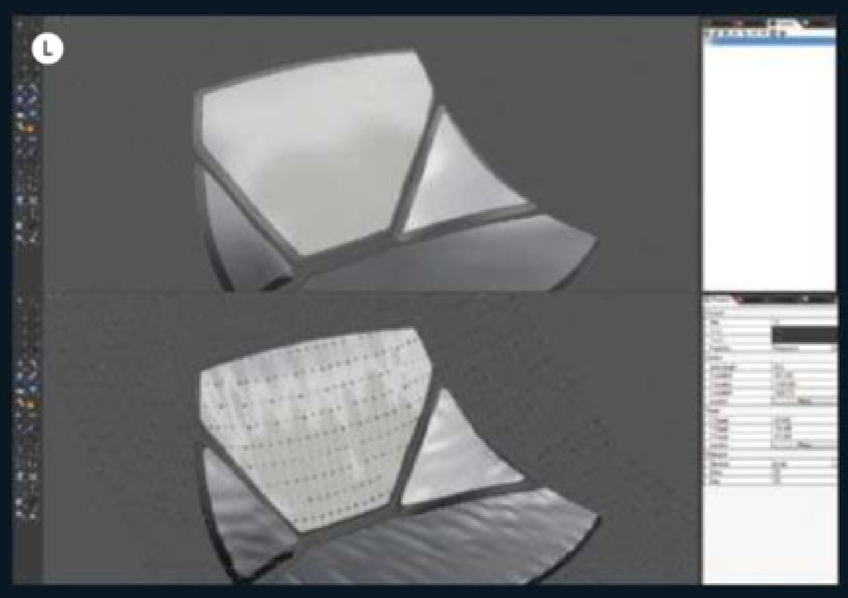


12 Get your wrinkles on Select the inner-surfaces, use the Split command and select all newly created curves. This will split the outer- and inner-part for all surfaces separately, so the outer-part (border) can now be deleted. These new surfaces are supposed to make some wrinkles and imperfections, so the 3D model looks close to reality. Select surfaces and rebuild them by 200 points in both U and V directions. The Control Points Network is now dense enough for perfect editing, so after enabling Control Points (F10) you can start creating wrinkles (L).





11 Cushioned elements Select surfaces and use the OffsetSrf command to create a new set. Set an Offset Distance of 15mm and turn off the Solid option. Type the command 'OffsetCrvOnSrf' and select any of these new offset surfaces with a Distance of 10mm, and hit Enter. Repeat this for the rest of the offset surfaces, use Rebuild to simplify the curves and re-create them with 100 points (K).



13 Sew and blend Now we'll create seamless transitions between our inner- and outer-surfaces using the Blend command. Type the 'BlendSrf' command, select two corresponding surface edges and confirm the selection. Adjust the Surface Blend by moving sliders for both edges and press OK. Select all three surfaces and join them to get a closed polysurface. Do the same with the rest of the cushions. Using the Pipe command and selecting the inner-edge will also add some nice detail to the cushion (M).

UV mapping with NURBS

NURBS have their own pros and cons. There are tons of pros for me, but to reveal some of the cons I'd have to mention UV mapping, as it's the biggest problem I've ever encountered with this technology. Clay models are always perfectly smooth, with great topology, but be careful of complex polysurfaces as it's hard to create proper UVs for them.

(J) It's always easier to work with an isolated object than with all the unnecessary curves and surfaces

(K) Interpolate curves on surfaces, describing the offset edge

(L) The Control Points Network makes it very easy to create wrinkles and organic imperfections on surfaces

(M) Create seamless transitions between the inner- and outer-surfaces using the Blend command

Textures & materials

Give your model its textural qualities and render the results

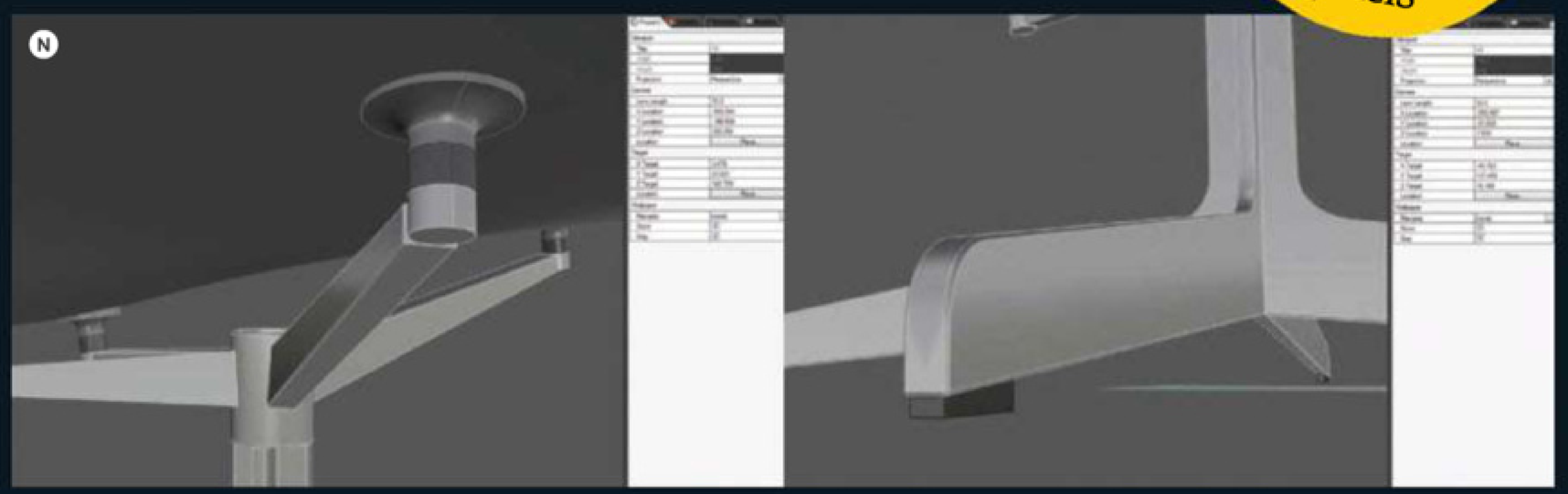
4+ hours creation time
Resolution: 6,000 x 3,800 pixels

14 Final mapping Add a small box under the legs object; its length is visible in the CAD drawings, so follow those. We'll fillet all sharp edges so that there aren't any unfilleted edges left on the model. For basic shapes you can create Box mapping, but for complex objects you'll have to add a UV map. This is just one click in the right sidebar N.

15 Add texture Textures are mostly edited with Photoshop using more texture references. A Normal map for the leather is created using PixPlant (get a free trial from **www.pixplant.com**), while the Reflection map for the leather is a modification of another and very different leather texture in order to achieve a worn look. Metal reflections will be a very important part of the realism of this chair, so create some fingerprints using Photoshop brushes. Get the fabric texture from **www.flyingarchitecture.com** and simply change its colour in Photoshop O.

Photoshop magic

It's generally better to work with larger resolutions than strictly needed. You can play a lot with details in post-production, which is very efficient for quality results. I usually work with 4,000 x 2,500-pixel images in the post stages. Regarding colour adjustments, try to work not only with Curves but also Selective Color for each different part of the rendered image. You can also use Render ID/ Material ID channels for easy masking.



N Be sure to follow your CAD drawings carefully to get accurate results

O The textures with their respective maps: fabric with Diffuse and Bump; leather with Diffuse, Reflection and Normal; and metal with Diffuse, Reflection filter and Reflection Glossiness maps

P Set up materials in V-Ray for realistic results

Q The final render at 6,000 x 3,800 pixels is taken into Photoshop for post work

16 Use V-Ray materials For the final render we need four materials: fabric, leather, plastic and metal – this is without considering basic wall and floor materials, we're just focusing on the chair itself.

- **Fabric material –** As Diffuse use the TexFalloff material. Select the fabric texture for both slots. For the Color 2 slot set the Gamma value to 2.0, so under Specific Angle we get a lighter fabric without the need for a reflection layer (this saves time). The Falloff type must be set to Fresnel.
- **Metal material –** Diffuse with Reflection channel as well as Reflection Glossiness maps with fingerprints.
- **Black plastic material –** A simple Diffuse colour with Noise on the Bump map and a Scale of 3.
- **Leather material –** Again, Fresnel Falloff for Diffuse, Reflection Glossiness and Bump. Repetition is important P.

17 Render and post This stage should be very familiar: V-Ray rendering and Photoshop post-production. To work fast, use an Irradiance map and Light Cache to achieve faster rendering and don't forget to add Reflection, Z-Depth, Specular and Material ID channels as well. For lighting I use a dome light with one planar source to brighten the shade. General colour corrections are made in Photoshop, also using the Reflection channels from V-Ray Q.

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Zombie Playground, Massive Black

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Image: The Sunken Village, Christian Gerth, Switzerland

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Tutorial files:

- The atmosphere file Drea used in her scene: 'Abandoned_atmo.atm' plus tutorial screenshots

Concept

When I first saw some top-down reference photographs of ruins and cliffs overgrown with vegetation, I had a specific workflow in mind to get the best results in 3D using Vue.

Our artist's shopping list

Drea has used a few commercial products to realise this scene, but you can easily use assets from your own library or what ships inside Vue

Drea uses:

- ☑ Ruin model from Renderosity. Drea also recommends this free alternative: **http://tinyurl.com/ruinmodel**
- ☑ Cliffhangers by Mark Lawson – $20 US on Cornucopia: **www.cornucopia3d.com/purchase.php?item_id=11447**
- ☑ Long grass and hanging roots from AsileFX. You can find free grass and roots models at AsileFX too: **www.asilefx.net/catalog/free_stuff.php**
- ☑ High-quality shrubs from Xfrog – **http://xfrog.com**. You can also get 130 free Xfrog plants here **http://xfrog.com/130-free-xfrogplants-now-available**
- ☑ Spectral v2 Clouds – Low Altitude pack from AsileFX. Get a free AsileFX sample cloud pack (including the cloud layer Drea uses): **www.asilefx.net/catalog/free_stuff.php**
- ☑ D&D Creations' Canyon Terrains pack – **www.ddcreations.eu**

Create an epic Vue landscape

Abandoned 2012

"The focus in this scene is an old ruin in a natural, picturesque environment. The image depicts the discovery of forgotten places"

Drea Horvath is a 3D landscape artist

When I was assigned to write this tutorial, I was happy to learn that it would be based on a lush, rocky environment from a top-down view. I love creating environments from a bird's-eye view, so a concept came to me quickly.

This tutorial will illustrate the key steps to building an epic landscape. From planning to rendering and post-production, you will learn all the techniques I use. I'll describe how terrain is generated as well as how I set up multi-layer material distribution, achieve realistic lighting, optimise materials for greater believability and shorter render times.

Throughout the tutorial you'll notice that I'm using commercial products to build the environment. Don't worry: the tutorial focuses on methods that can be applied to any kind of content you have in your library. For example, grass from AsileFX is my personal choice, but Vue ships with several kinds of grasses you can use without having to purchase extra items. We'll focus on EcoSystem manipulation, atmosphere and lighting settings, render setups, optimisation, material tweaking and so on. All of this is important when it comes to building scenes in Vue, regardless of what content is used.

Step by step

Easy-to-follow guides take you from concept to the final render

Artist info

Drea Horvath

3DArtistOnline

Username: Drea

Personal portfolio site
www.dreahorvath.com

Country The Netherlands

Software used
Vue, Photoshop, Filter Forge

Expertise 3D artist Drea specialises in creating detailed and realistic landscapes using Vue. She has particular strengths when working with atmospheres and lighting

Software used in this piece

Vue | Photoshop | Filter Forge

Initial steps, terrain and materials

Set the foundations of this large-scale environment

01 Choose your terrain I've chosen the Eroded Canyon terrain from my (D&D Creations) Canyon Terrains for Vue pack, as it perfectly fits the scene (available online at **http://tinyurl.com/canyonvue**). This detailed terrain has a curvy riverbed and steep, highly eroded cliffs. The shape is based on a procedural terrain created in Vue using the terrain fractal with Canyon and Strata filters. The erosion was added using the World Machine 2 terrain generator (**www.world-machine.com**). You can find the terrain supplied with this issue's disc (unfortunately not available with digital versions). With the terrain loaded, I find a spot with a cliff wall that looks iconic enough to be in focus with the ruins. I can then add my ruin components (a model purchased from Renderosity.com) next to the wall and adjust the camera angle to suit A.

02 Control material distribution The terrain has three layers of material: in the riverbed we have a wet, sandy area; the cliff walls are sandstone; while the flat surfaces have a green, mossy material. Before loading these, I set the material distribution – with the help of highlighting the materials with different colours – so I can see and control the distribution easier. First I set the terrain's material to Mixed Material: material 1 becomes the riverbed; material 2 becomes the rest of the terrain. I set the Distribution dependent on Altitude (100%) only and set the Mixing Proportions to 72% B.

03 Assign your proportions Next I select the second material and change it into a Mixed Material; its second material becomes the moss layer. This time the material distribution is dependent on Slope (100%) only. The Mixing proportions are set to 31%. After setting up the distribution, I can load materials: a darker sand from the RealSand pack, our own sandstone material (supplied) and Grass 'n' Rocks from the Cliffhangers product by Mark Lawson. You can find Mark's products on Cornucopia3D: **www.cornucopia3d.com/purchase.php?item_id=11447** C.

A A distant shot of the spot on the terrain where the ruins will be placed

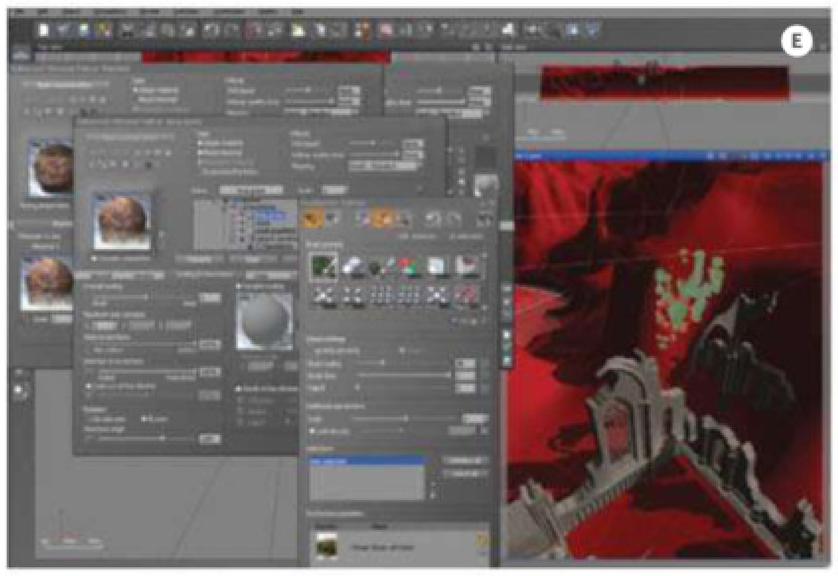
B A shot illustrating the first steps of controlling material distribution

C The highlights show how the materials will be distributed in the scene

Add some vegetation

The next few steps will focus on EcoSystems manipulation

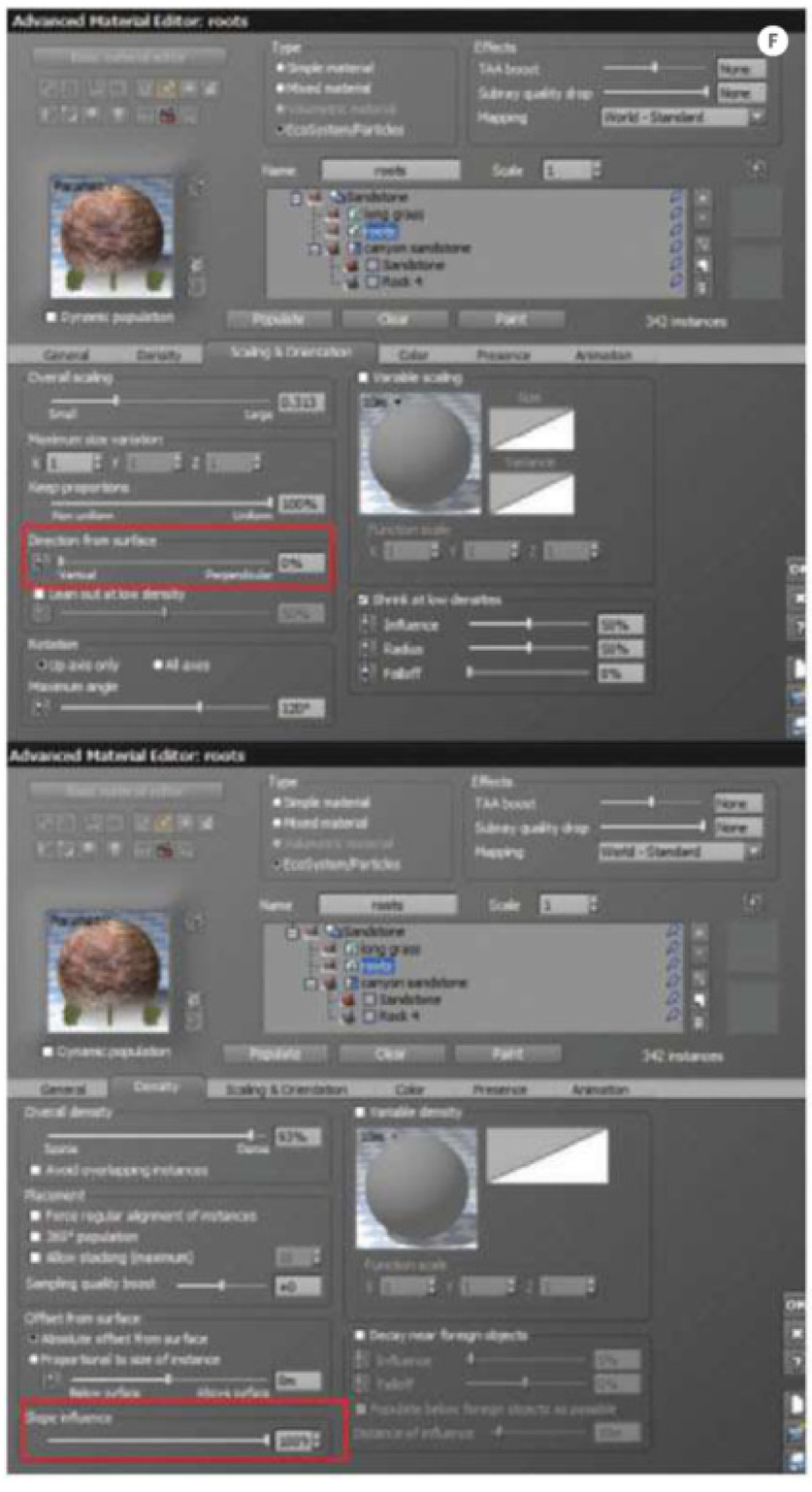
04 Add a murky river Before getting fully stuck into Vue's EcoSystems feature, let's quickly discuss some tricks for handling water in Vue. After loading water into the scene, I tweak the material to make it look more like a river you'd find in a canyon. Check out some reference photos for examples of this, as there really is a distinction to be made. Try using a physical water model with a darker-brown Absorption colour and a light-brownish Scattering colour to help it fit the environment. The Depth where the light can reach in the water is set to 6.2 metres. I increase the Highlight Intensity to 84% and Highlight Size to 80%. To finish I change Highlighting to 81% Anisotropic **D**.

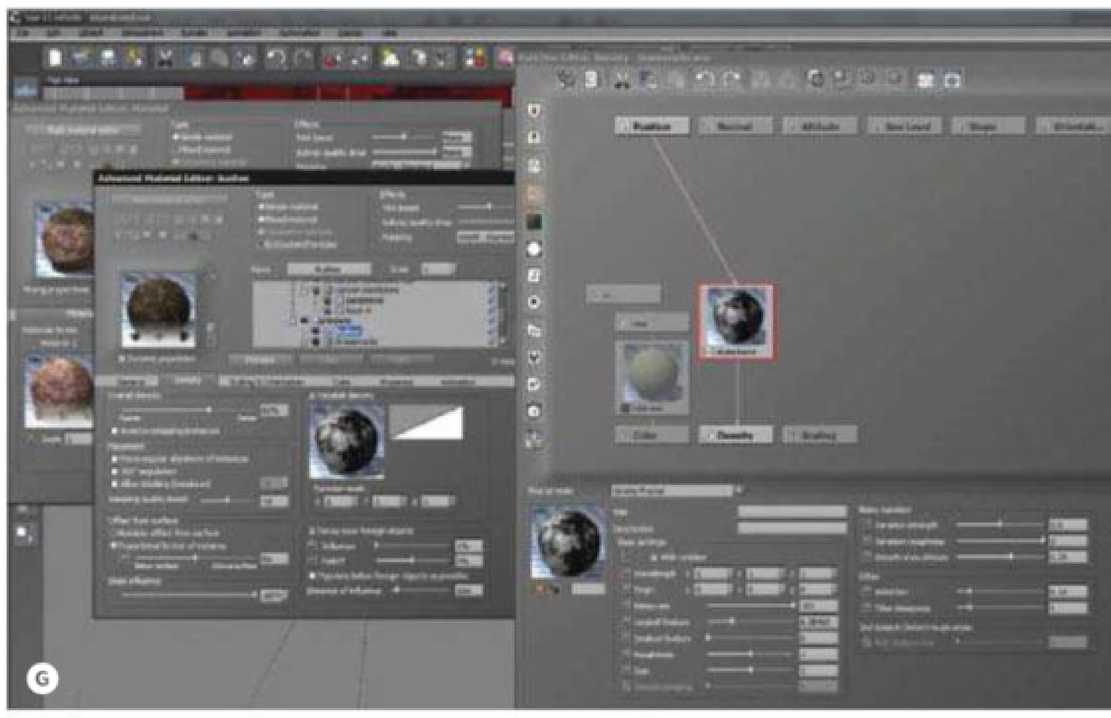


05 Overgrown cliff I set up the EcoSystem of the cliff in the middle. On the cliff wall (sandstone material) I use three layers of ground-covered EcoSystem: a layer of long grass from AsileFX Grasses (**www.asilefx.net**), a layer of hanging roots – also from AsileFX – plus a layer of small field-grass plants. Due to the scale of the terrain, even Dynamic Population isn't an option, so I apply the EcoSystem Painter on the cliffs to distribute the foliage manually. I set the Direction to 100% Perpendicular and due to the steepness of the cliff I also enable 360-degree Population **E**.

How to achieve realistic lighting

Realistic lighting is one of the most important factors in a scene. Lighting can make or break a scene, whether it's a realistic, fantasy, surreal or sci-fi landscape. Even if you look at the most surrealistic image possible, if the lighting is bad it can make you question what you're looking at. The Global Radiosity lighting model is the only model that perfectly imitates realistic lighting with indirect light and colour-reflected light. This means the only light source you need to use to light up the whole scene is the Sunlight.





06 Populate the ruins The goal of the grassy groundcover EcoSystem is to help the cliff and ruins blend together. This is an effective way to unify the whole scene and draw the viewer's eye around all the details. On the ruins I use a similar EcoSystem: a layer of the same long grass plus a layer of hanging roots. The grass layer's direction from the surface is set to Perpendicular, while the roots are set to Vertical. The Density of the grass is set to 100%, while for the ruins it's set to 93%. Before populating, I make sure I set the Slope Influence to 100% **F**.

07 Insert bushes Since I want the bushes to grow on flat surfaces only, I add this layer to the mossy material. In this EcoSystem I use three shrubs from Xfrog (**http://xfrog.com**). To achieve realistic distribution I tick Variable Density and load the grainy fractal. To save resources, I use Dynamic EcoSystem Population. On the leaves I set the Highlight colour to white, increase the Highlight Intensity and make it duller. In the Effects tab I set Backlight to 100%. To speed up rendering I reset the Bump map and disable Caustics **G**.

D How the scene looks after loading materials and water

E I paint the EcoSystem onto the rocks using the new EcoSystem Painter in Vue 11

F Settings for the roots layer of the EcoSystem on the ruins

G Settings used for the Variable Density of the bush layer in the Function Editor

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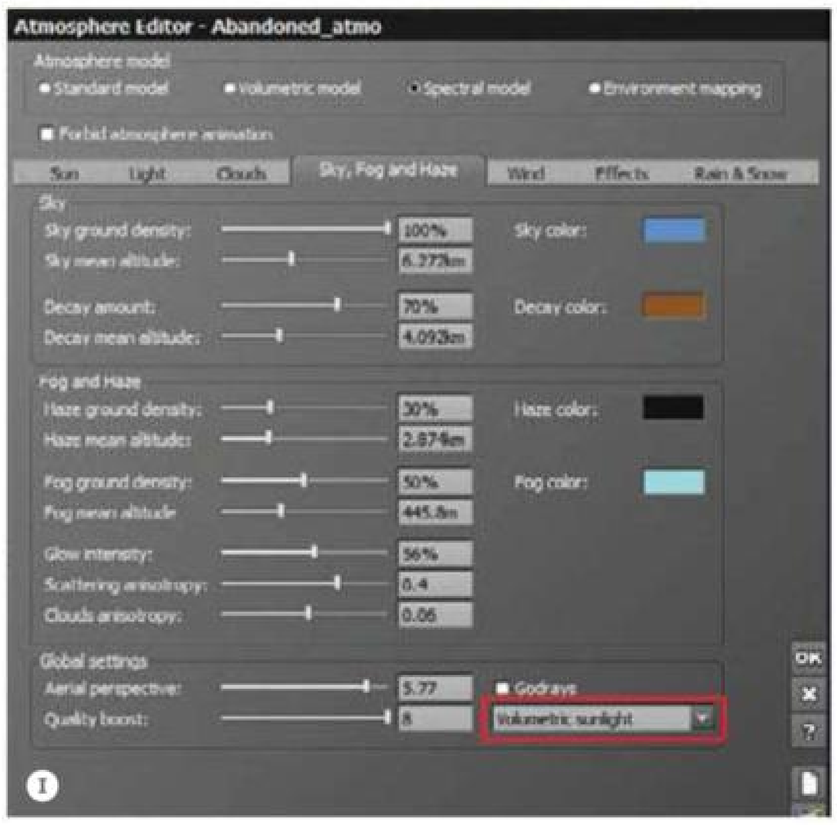
Lighting & atmosphere

Take a few steps to shed realistic lighting and atmospheric effects

H



I

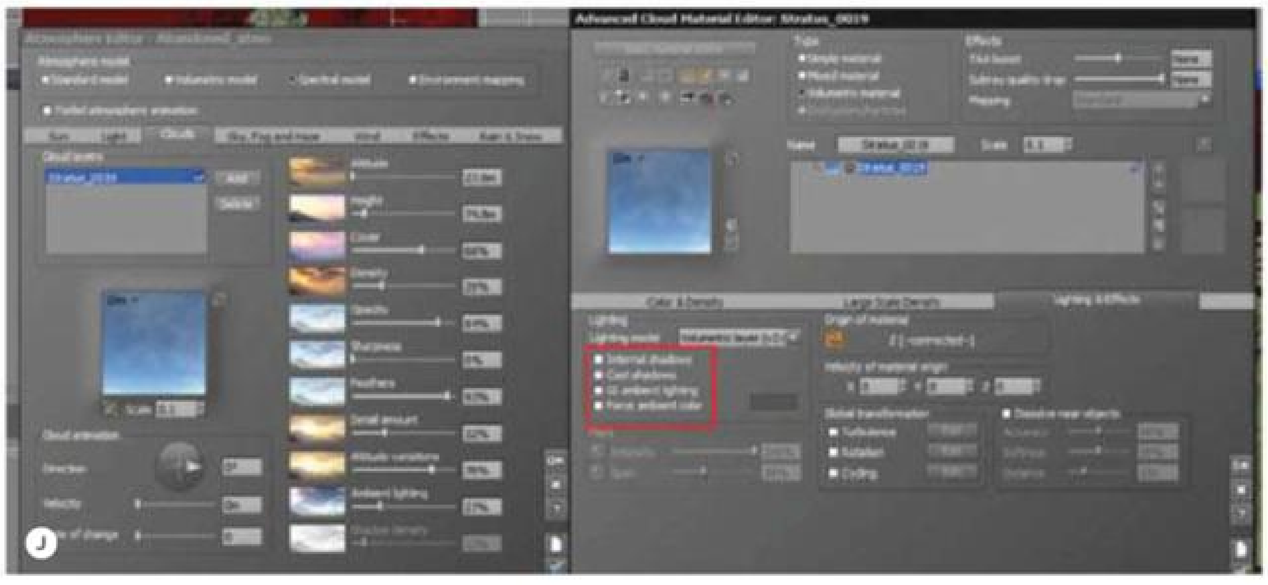
08 Global Radiosity Now it's time to add some atmosphere using the Light tab. The first step is to enable Global Radiosity, with Indirect Skylighting and Optimize for Outdoor Rendering ticked. I set a low Gain value of 0.4 and a very dark-greenish Bias colour (RGB 21, 25, 23). To get effective contrasts I set Light Balance towards Sunlight (90%). The ambient light comes entirely from the sky, providing a realistic and rich ambience H.

09 Atmospheric effects In the Sky, Fog and Haze tab of the Atmosphere Editor, it's vital to enable the Volumetric Sunlight option. This is essential to achieve realistic lighting. With higher Haze (30%) and Fog (50%) levels I can generate subtle rays where the terrain blocks the sunlight. It's also important to set a dark Haze tone, since particles in our atmosphere are dark. The Glow Intensity is set to 56%, Scattering Anisotropy to 0.4 and the Aerial Perspective value to 5.77 to give more depth to the scene. Finally, Quality Boost is set to +8 to avoid noise I.

Use static plants for more realism

Professional versions of Vue ship with a huge library of detailed SolidGrowth plants and you can also browse hundreds of other plants available for purchase, like those on the Cornucopia store: www.cornucopia3d.com. These are prefect for distance shots, but due to lower-quality Alpha mapping on their leaves, they're not suitable for close-up views. This is why many studios pick static plants, such as Xfrog (http://xfrog.com) or SpeedTree (www.speedtree.com) models. However, you can't edit them in Vue's Plant Editor and they tend to render very slowly.

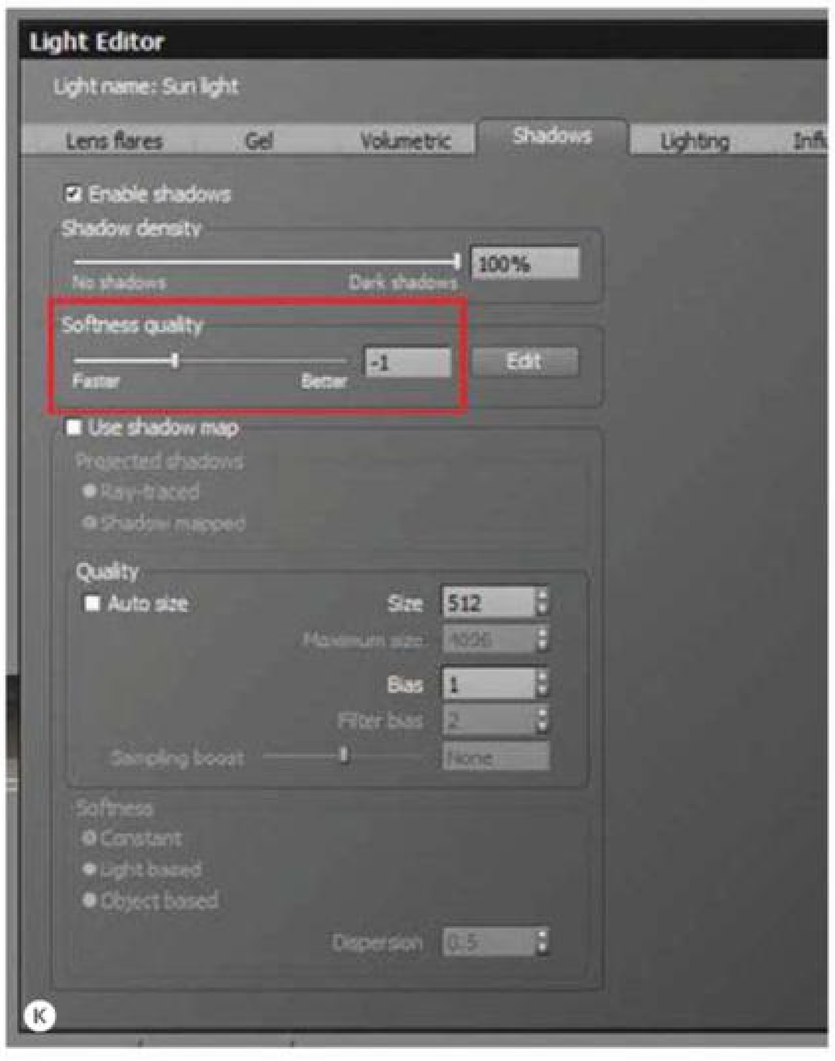
> After tweaking the atmosphere... it's time to take a few steps to speed up the rendering process without any virtual quality loss



J

10 Add some low fog I want a sparse, low fog layer over the river in the background, so to begin I add a stratus cloud from AsileFX's Spectral v2 Clouds – Low Altitude pack. I set the Altitude to 27m and the Height to no more than 75m. I increase the Detail amount and the Altitude variations, then set the Density to 29%. In the cloud's Material Editor I set the Volumetric colour to white J.

11 Get ready to render After tweaking the atmosphere to a point where it can be considered ready, it's time to take a few steps to speed up the rendering process without any virtual quality loss. In the Atmosphere Editor I reduce the Lighting Quality to -0.5, then open the cloud's Material Editor and in the Lighting & Effects tab disable all four options. In the Light Editor I also reduce the Shadows Softness Quality to -1 K.



K

H Settings in the Light tab, activating Global Radiosity in the Atmosphere Editor

I Settings used in the Sky, Fog and Haze tab of the Atmosphere Editor

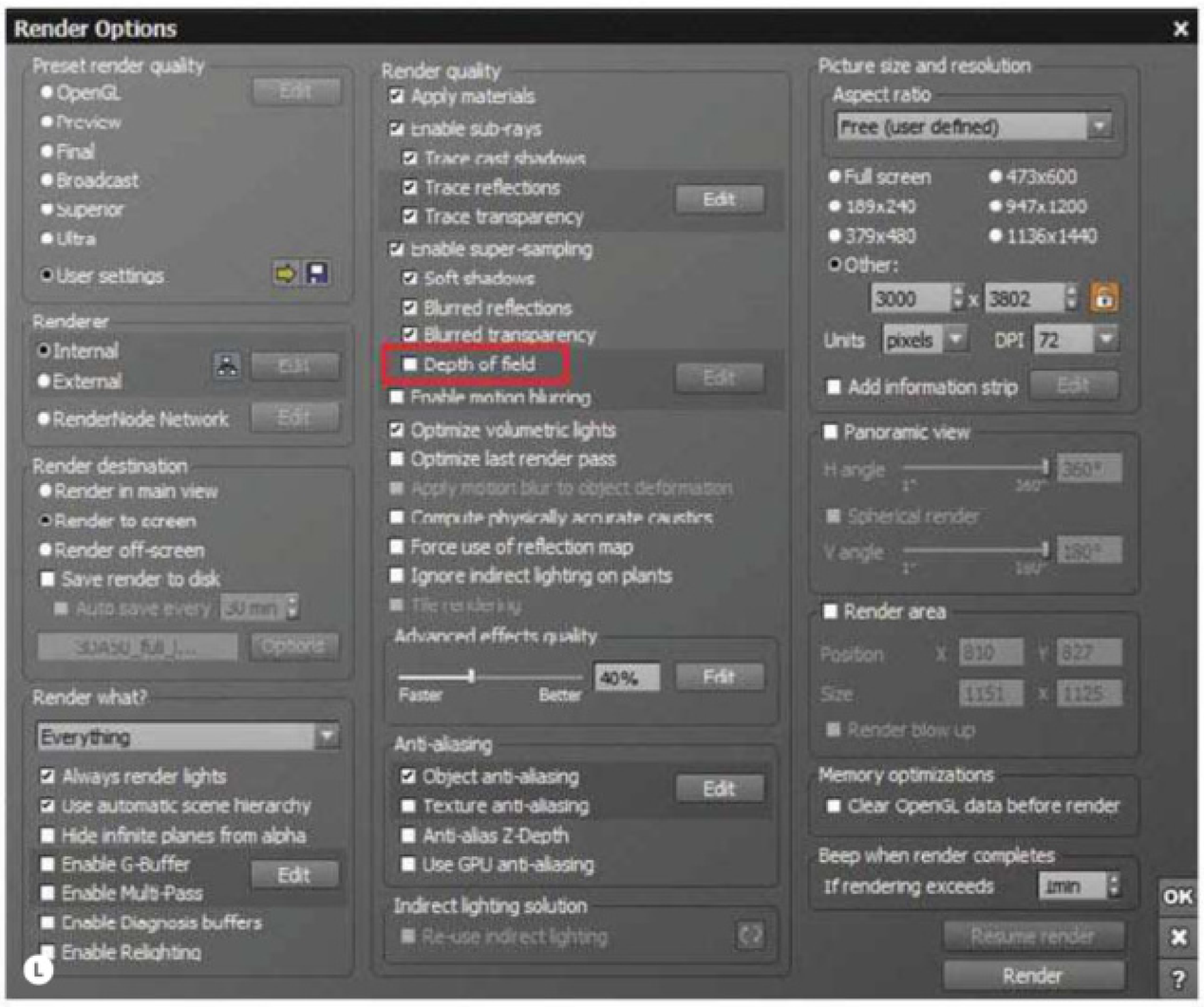
J The cloud and cloud material settings being tweaked in the Atmosphere Editor

K Settings in the Light Editor – Shadows Softness quality is set to -1 for quicker rendering

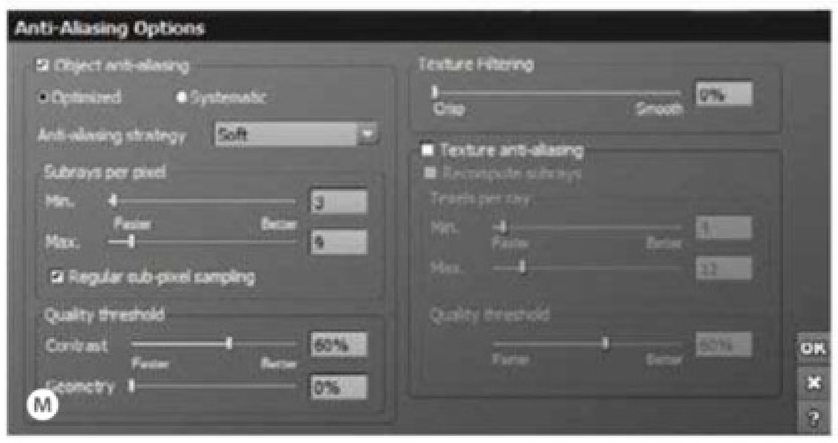
Rendering & post-production

We can now take our final steps to finish up the work

4–5 hours creation time
Resolution: 3,000 x 3,800 pixels

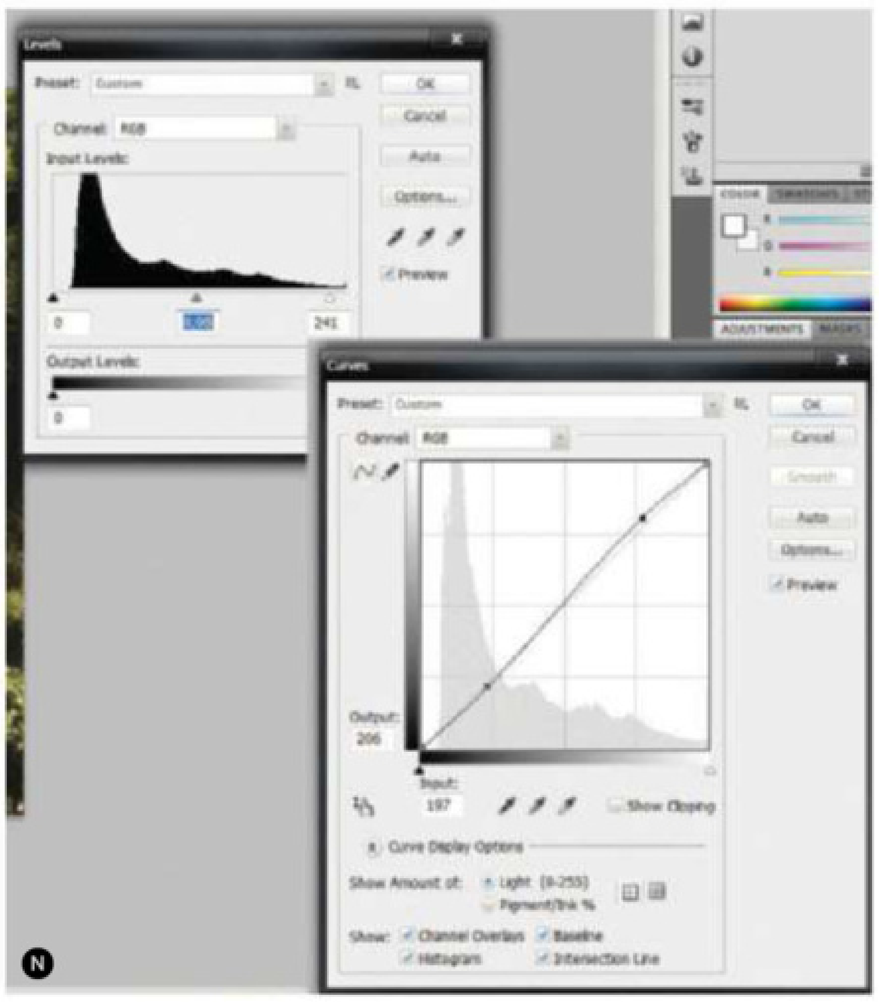


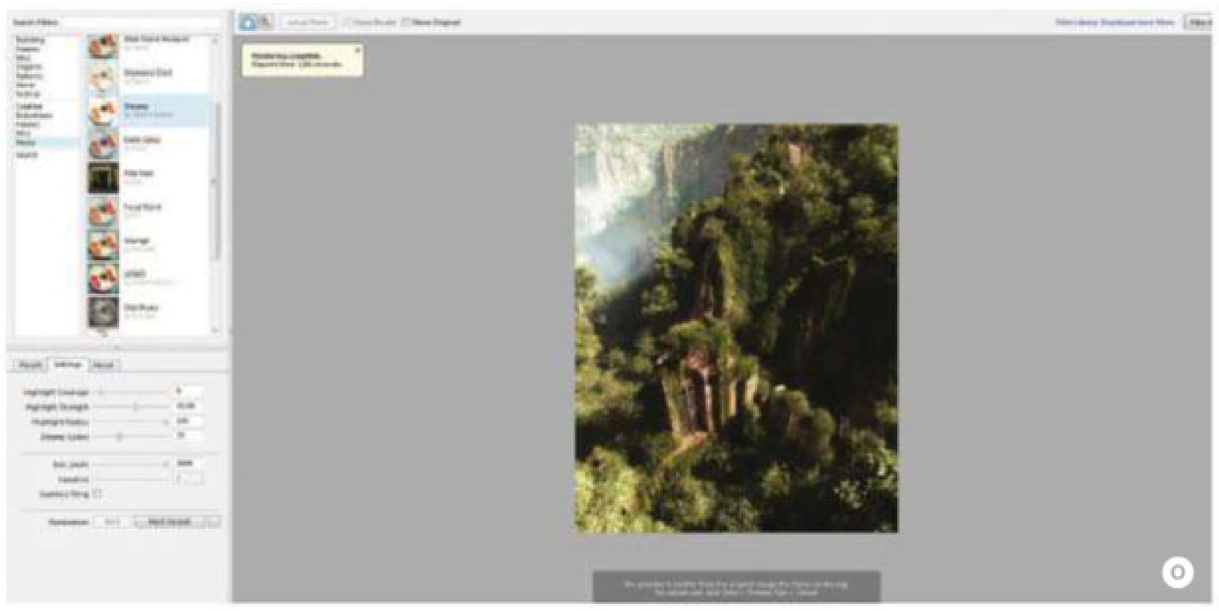
12 Render settings After going through the usual optimisation steps – ensuring the lighting is exactly how I want it and so on – the scene is ready to be rendered. In the Render Options I select User Settings and disable Depth of Field, as this isn't something we need for this particular project. I set the Advanced Effects Quality to 40%. You may think this sounds low, but with the right atmospheric settings it's enough. Of course, feel free to go your own way and see what works ❶.



13 Anti-Aliasing and rendering Since the scene needs to be rendered for print in a large resolution, I choose to use a soft Anti-Aliasing method, with Min 3 and Max 9 Subrays per pixel. With these settings we save a lot of detail and, due to the low Subray count, the rendering process is quicker. With these settings applied I don't need Texture Filtering, so I disable it. The scene was rendered in a little less than 19 hours at a resolution of 3,000 x 3,800 pixels. I used a single machine with an i7-2600k CPU and 16GB DDR3 RAM ❻.

14 Post-production in Photoshop When a render is done, I always load the image into Photoshop for a little post work. With this project I adjust the contrast, make the highlights more powerful with Levels adjustment layers and further enhance the image with Curves. To help the vegetation look more realistic, I slightly saturate the green and yellow tones on the leaves ❹.





❶ A screenshot of the render settings used in this scene

❻ A screenshot of the Anti-Aliasing settings applied to the scene

❹ A screenshot illustrating the Photoshop Levels and Curves adjustments

❺ See how the settings on the left changed the image?

Post-production enhancements

It's a never-ending controversy among Vue users whether to use any post work on renders or not. In my opinion, what counts is the end result and the process of creation is not supposed to stop when the picture is rendered. Tools such as Photoshop don't just enable you to enhance your render, as you can use them for fixing minor issues as well. For example, in this scene I used the Clone tool to cover some areas with grass. I also use this a lot to hide floating roots, fix materials and artefacts on rocks, or to remove sharp lines where two materials meet. It's possible to fix these issues in Vue, but leaving some fixes for post work saves a lot of time.

15 Filter Forge tweaks If you want to give a really nice boost to your renders, Filter Forge (**www.filterforge.com**) is a perfect choice. I mostly use the Dreamy filter on my images, because it provides more control over the highlights, contrast and colours. I don't want the highlights too strong in this project, because that way I'll lose details in the background. However, I still want to make the atmosphere more powerful to give a real impact and complement the piece. To do this, I set Highlight Coverage to 9, Highlight Strength to 57, Highlight Radius to 100 and Dreamy Colors to 35. This gives a bit more contrast and vibrancy to the overall effect ❺.

I made this... Retrospective

Artist info

Pascal Blanché

Website
http://pascalblanche.cghub.com
Country Canada
Software used 3ds Max 3.1
Bio After two years of working on *RuneScape* for Jagex, Pascal is now at Ubisoft Montreal

Software used in this piece

3ds Max 3.1

Mermaid 2002

We take a look back at significant artworks created by world-leading 3D artists. This issue, we go behind the scenes of Pascal Blanché's popular 3D character created over a decade ago...

"At the time I was having fun with a creation process I forced myself into: taking a classic theme and shuffling the rules a bit," Pascal says. "In this illustration, for instance, I went for a reversed mermaid – and instead of having a girl's top and a tail, well, I created a fish top with human legs!"

> "The tentacles are just cones and torus shapes combined and then constrained to a spline. Once I was happy with a tentacle shape I created a snapshot of it and moved to the next one"

> "I created all the jewellery elements using Art Deco typography found on font sites. I converted them into splines and solid objects, then combined them with primitive shapes"

With the Disc

Tutorial files: Find a screenshot of Titouan's settings for this mermaid's scales

behind the scenes

3D artists explain the techniques behind their amazing artwork

Artist info

Titouan Olive

Personal portfolio site
http://digitalia3d.teria.fr

Country France

Software used
ZBrush, Maya

Expertise Titouan specialises in character and creature creation for illustrations

Software used in this piece

ZBrush

Maya

Learn how to

- ☑ Block out the main shapes of a female character
- ☑ Sculpt ideal anatomy for a mermaid creation
- ☑ Create fish-like scales ready for textures
- ☑ Texture your character for realistic results
- ☑ Easily tackle lighting, shading and rendering
- ☑ Take care of post-production work in Photoshop

Concept

The main focus is to create a modern mermaid that attempts to avoid clichés to develop something more unique. A mermaid gives us opportunity to practise human anatomy, perfect our skin textures and play with fish-like scales.

Skin & scales in ZBrush

Mermaid 2012

"This mermaid character's pose encourages the viewer to consider her existence in the real world"

Titouan Olive is a freelance 3D artist residing in France. He loves nothing more than to create unique character illustrations that surpass our expectations

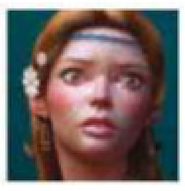
This tutorial will explain my character-creation workflow while sculpting this mermaid character, which depicts both human-skin and fish-scale textures and materials. I'll begin by focusing on the process of sculpting and adding colour to the character in ZBrush, then explain my general workflow and approach to lighting and rendering.

We'll begin the project by sculpting a basic head and body, then go on to add details and pose our full character in ZBrush. We'll be making use of some great tools, plug-ins and powerful functions available with ZBrush. I'll also show you how to add coherent colours through the PolyPaint menu to give a more presentable and attractive look to your characters. Last, we'll export the model into Maya to create our final render – although you can use any software of your choice for this.

Through the 17 steps of this tutorial I'll try to give you tips and tricks so that you'll be able to get the best out of your work and improve your skills in character-creation – both artistically and technically speaking.

Keep it simple!

Try to maintain good proportions. You're building the base for your character at this stage, so you don't need to worry about details yet. Keep your shapes as simple as possible and don't focus on definition – a solid foundation is the key to building a successful character. Try considering basic shapes and how they relate to one another in a compelling way. This will help with the aim of creating a sense of balance and harmony.

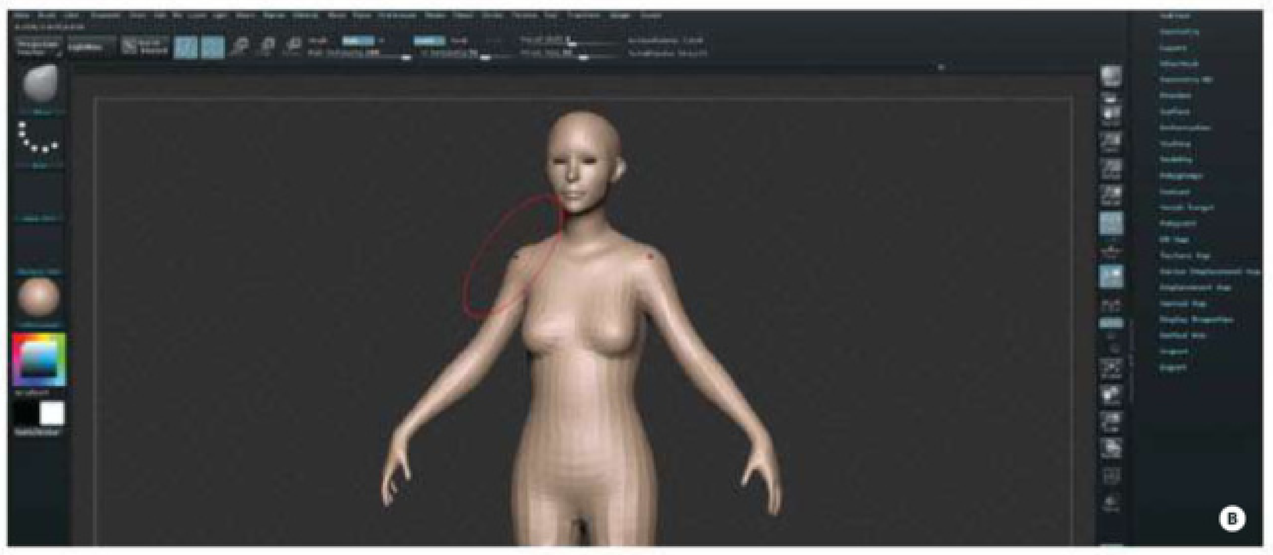


Lay out your ideas

Before starting the main 3D work we'll need an initial sketch

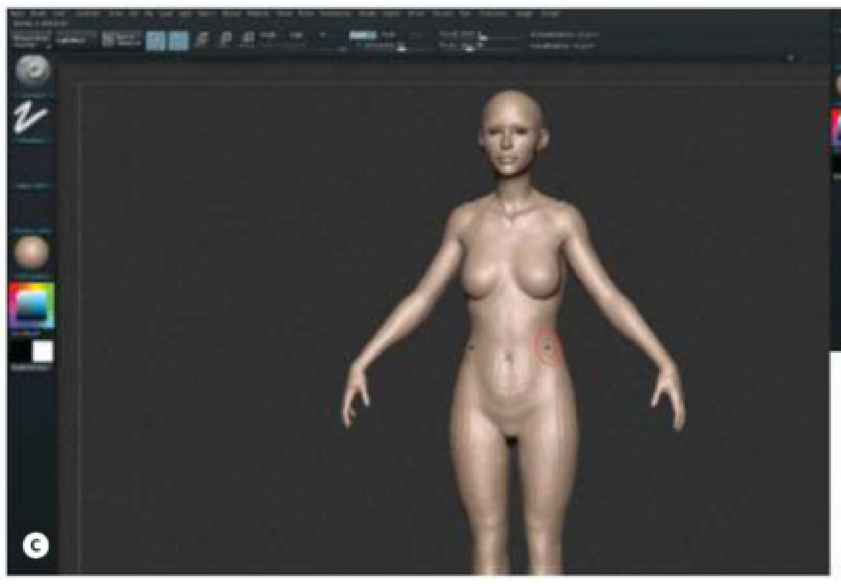
01 Start a concept and get references

Each time I start a new project, and before doing anything else, I always begin by getting my ideas down on paper. There's no point spending too much time at this stage, however, since we'll develop and improve the idea directly in 3D. We'll keep this concept as a direct line to help us as we go along. It's also good practise to work with several references during your work – not to copy them but use them to make your work more solid and accurate. You can search the internet and books to gather images that will be helpful as references. When all the decisions have been made with regards to the concept, we can start the sculpting process, following our drawing as a guide Ⓐ.



02 Establish the base

To start this character I use my own base mesh. If you don't already have your own, you can always use one that's readily available inside ZBrush. To do this, simply open ZBrush and hit the comma key (,) on your keyboard to launch LightBox. Click on Tool and choose Julie.ztl. Delete all the other SubTools and each subdivision level. You can now start to sculpt from this basic base mesh Ⓑ.



03 Start sculpting

If you haven't already, activate Symmetry (X) and start sculpting at a low resolution to get the basic shapes down. For this stage I'm using the Move tool. I make some retouches to the arms, bust area and various elements of her face Ⓒ.

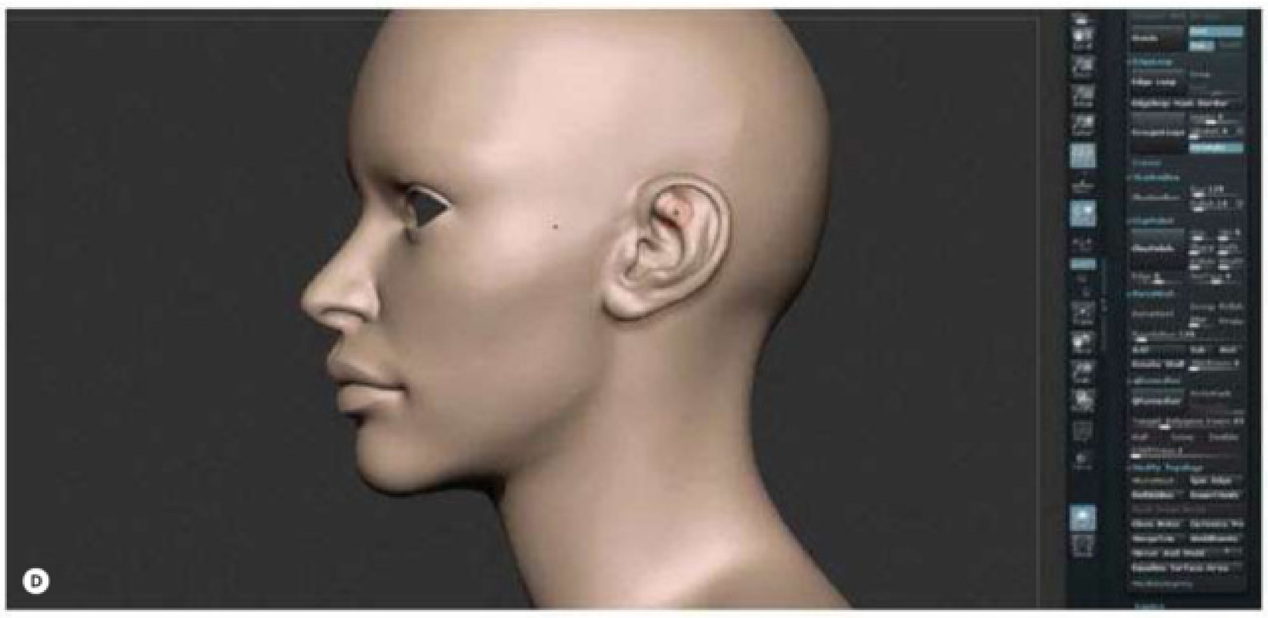
Ⓐ Try to sketch several quick concepts and select the one that works best

Ⓑ There are several base meshes inside ZBrush that are ready to use – if you need one, select Julie.ztl and start sculpting

Ⓒ Turn Symmetry on and use the Move brush to build the overall shape of the character

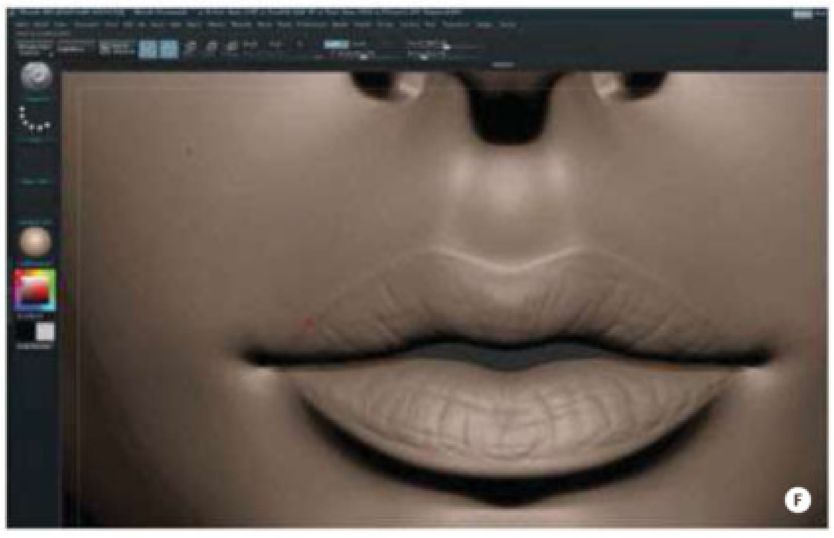
Flesh out the head

Establish your proportions and sculpt the face

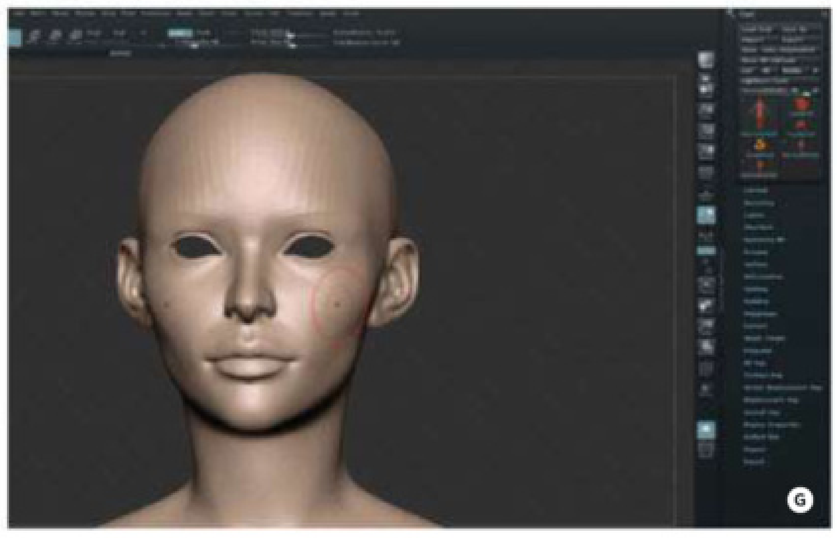


04 Define the head I need to scale the head now to suit the concept I'm working with. To do this you can keep the X Symmetry on, but make sure Perspective is off. Place your camera on the Side view, then activate the Scale mode (E) and Cmd/Ctrl-drag on the head to mask it. Inverse the mask (Cmd/Ctrl-click on the canvas) and scale the head. When the basic shape is suited to the design, I divide the model and start sculpting. Once the model is subdivided, I can then use the Standard brush to refine the shapes further and block in some specific areas, like the ears ❶.

05 Check your silhouette Getting a solid overall shape and well-balanced proportions is the most important part of a character sculpt, so you'll achieve a good model this way. All the details will be added later so I can't stress enough the importance of keeping things simple for now. To see a clearer view of the silhouette, go into the Render menu, select Flat and choose a dark colour for your model. This is a really useful trick to spot if something is going wrong with the form of your character ❷.



06 Sculpt the face Try to improve the facial elements of the character by pushing the sculpt to a higher subdivision level. Start working on the lips, nose, cheeks and so on. Be sure to always keep in mind that you have bones under your skin, and so should the character, so you must be able to get that fact across in your sculpt. I personally choose to accentuate the border of the lips now, as I always find it helps to frame the mouth in a pleasant and authentic way ❸.



07 Use Lazy Mouse and the Inflat brush When I want to inflate some areas – the cheeks, for instance – I use the Inflat brush. It's a great tool to get round and regular shapes, but take care when applying it: use a low Z Intensity setting or you certainly won't achieve the results you want. In some cases, I activate Lazy Mouse as it really helps when sculpting very smooth and accurate lines. To activate this setting, you just have to hit L on your keyboard ❹.

❶ Ears are unique, detailed and oddly shaped – you need to know how they are made to describe them properly

❷ Check the silhouette of your character often to make sure it's working as you want

❸ Try to push the sculpt higher now to start defining the personality of your character

❹ Don't hesitate to work in lower subdivision levels and use Lazy Mouse if you need to

Artist showcase

Titouan Olive

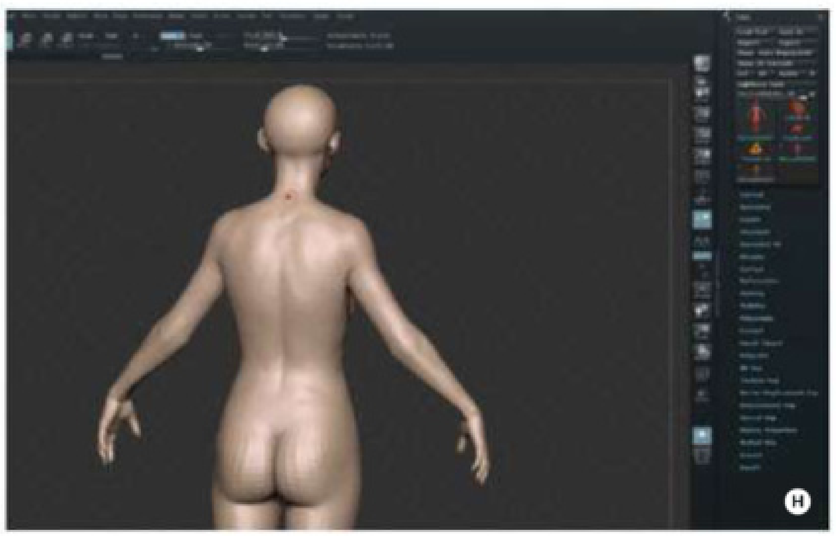
3D artist Titouan Olive works as a lead character and creature artist on animated films and videogames. He has also worked on various freelance projects for rapid prototyping, advertising, product design and architecture throughout his career. He is currently residing in France where he works as a freelancer.

The Mad Hatter **Maya, ZBrush (2010)**
The Mad Hatter is a character that was part of a complete illustration. It was made for a contest based on the theme of *Alice in Wonderland*

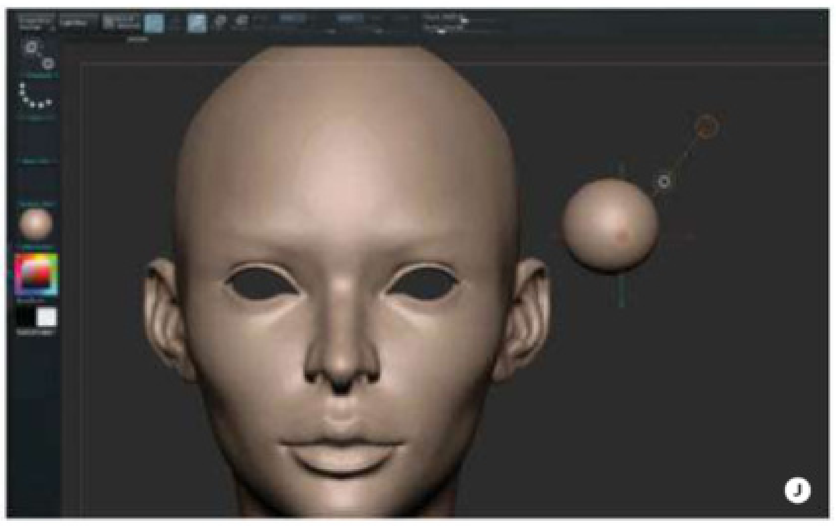
Mister Dandy Grass **Maya, ZBrush (2008)**
Here Titouan wanted to create a dreamlike and original image, while paying tribute do some of his favourite animated movies

Add some personality

Start working out the unique shapes

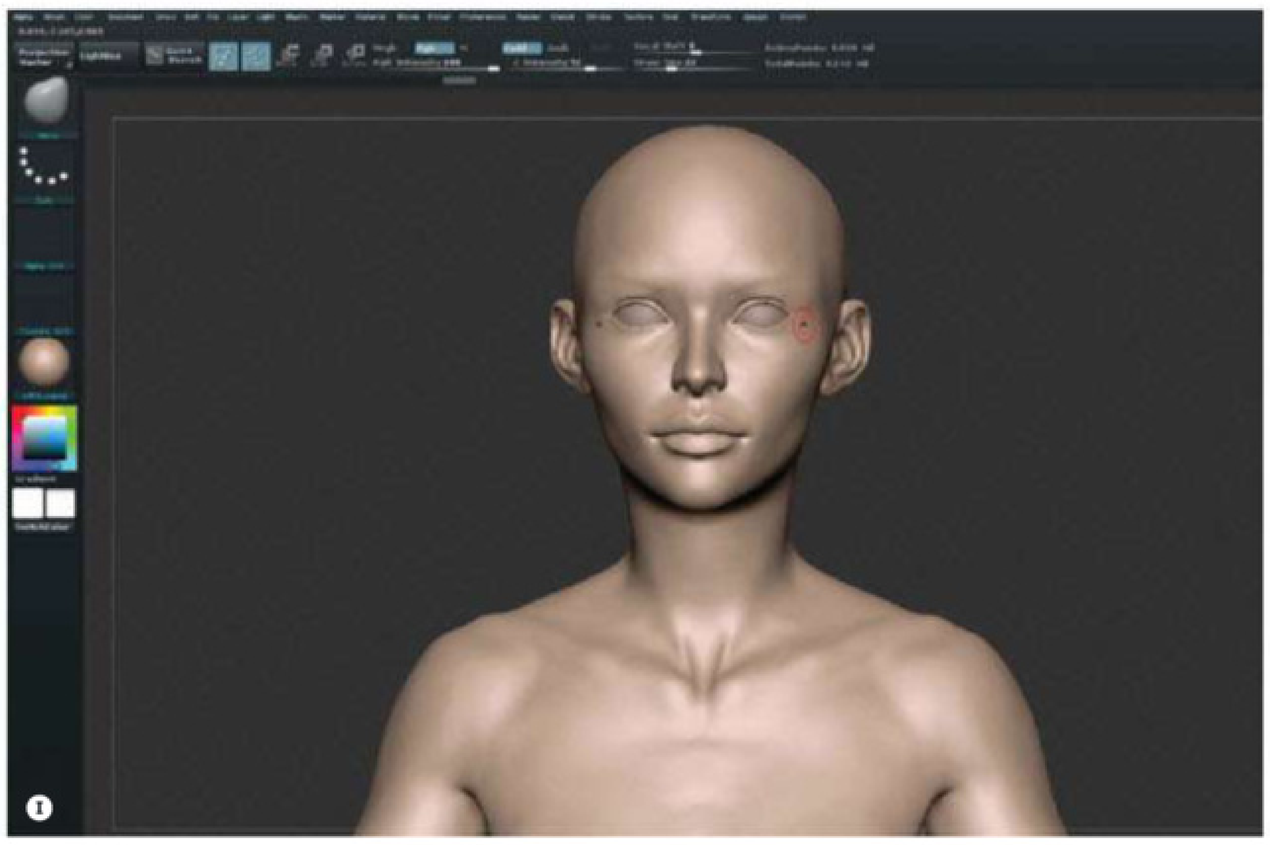


08 Bones and muscles Using the Standard brush, rough out the different anatomical elements like the rib cage, collarbones, back and arm muscles. Place them correctly and sculpt them carefully. Try to maintain good volumes and forms during this stage, work smoothly and respect the muscular and skeletal anatomy of the mermaid design. Here, again, the viewer needs to be able to understand that there are bones and muscles – even oil – under the skin, and you must correspond these details accurately to the type and age of the character you're building ❶.

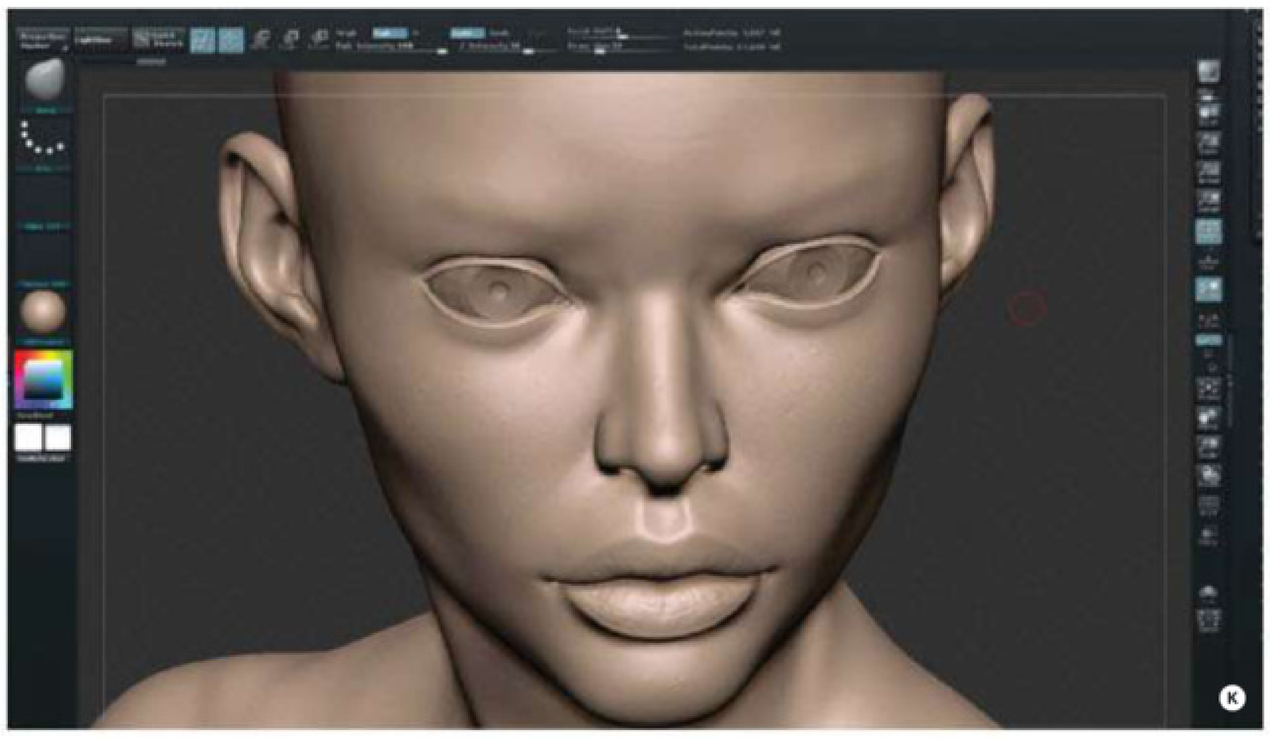


10 Build the eyes Understanding anatomy is extremely useful, but don't forget to always use reference images and your original sketch. To create the eyes, in the SubTool menu click on Append and select a sphere. Scale and place it in the orbit of the head to make the eye. When that's done, simply mirror it with the help of SubTool Master in the ZPlugin menu. At this point you'll definitely have to rearrange the eyelids with the Move tool to match their shape with the roundness of the newly created eyes ❷.

***Red Hero* Maya, ZBrush (2011)**
This character was sculpted, textured and posed in ZBrush, then rendered with mental ray in Maya. This truly individual result is typical of Titouan's artistic style



09 Use polygons and subdivision levels When I feel I don't have enough polygons to sculpt some areas correctly, I simply divide the model. However, sometimes it's useful to use the Pinch brush instead – this way you can get what you want without having to add another subdivision level. Remember, each time you divide in ZBrush, you're effectively multiplying your total poly count by four! ❸



11 Details and imperfections Once we've sculpted the eyes and added some very subtle wrinkles under her eyes, we can start adding colour. I sculpt the eyes using the Standard brush and add freckles and blemishes with the Clay brush. Remember to disable Symmetry before doing this to achieve realistic results. To create the subtle wrinkles under her eyes I need the help of the Standard brush in ZSub mode, coupled with Alpha 39. Once done I inflate the wrinkles with the Inflat brush. If you feel you need it, you can also use the Pinch brush to sharpen this area ❹.

❶ Try to work smoothly and respect the muscular and skeletal anatomy of the mermaid concept

❸ Divide your model if you feel you're lacking some control and/or precision on the face

❷ Don't forget to use reference images during this step

❹ We can now add some details to give more realism

Sculpting hands

Hands are really hard and time-consuming to sculpt because of the fingers and the amount of details required. For this reason it's best to use many references – not forgetting that your own hands are certainly the easiest to access! Block in the main shapes first. The backs of the hands and the fingers in particular have a strong structure with visible bones just under the skin, so remember to take this into account when sculpting.

Time to add colour

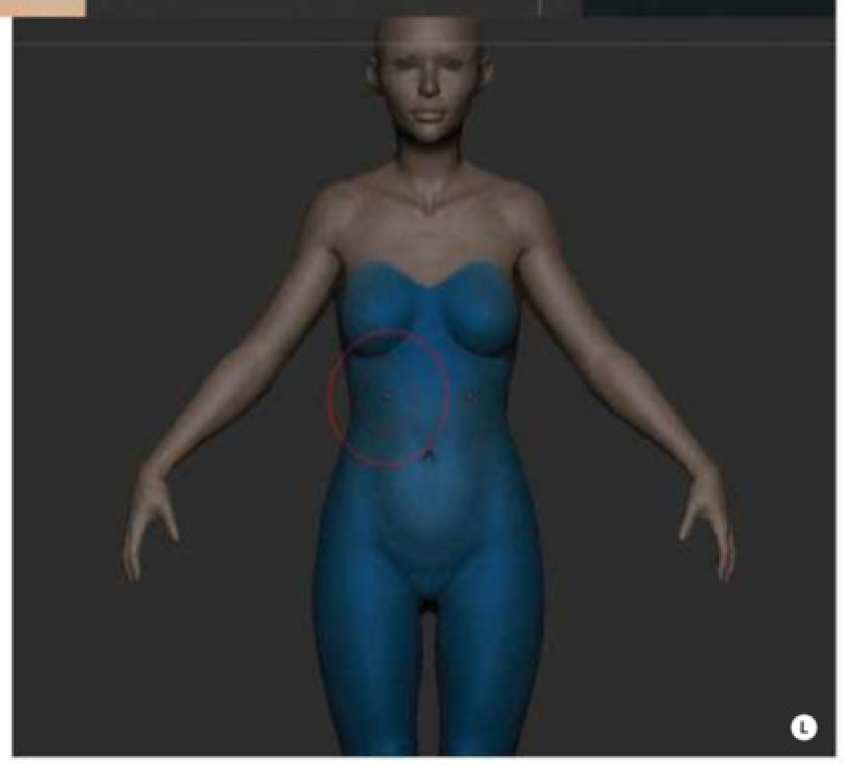
Let's bring the character to life with some PolyPainting

Material woes

Take care when using materials before painting colours, because many materials are already coloured in ZBrush and are not adapted for this stage. Try to choose a neutral material like SkinShade04 or Fast Shader, for instance. Don't hesitate to paint without any lighting, which could change what you see on the screen.

12 Block out the main colours I can now start to texture the model. My workflow is to block out the main colours in ZBrush using PolyPaint, then convert the PolyPaint information to a large texture and go on working in a 2D application, like Photoshop, where I can have more control to add as many details as I want. This method is really interesting and quick since you're not obliged to subdivide your model heavily, so just add the necessary details onto your Color map.

Try to achieve good skin tones for your character first, though. Since we're going to create scales on the bust and the legs, you don't need to spend too much time on those areas at this stage; simply paint a blue to indicate and set the limits of this zone. We'll use a very useful function called NoiseMaker to automatically create scales and their own colours shortly Ⓛ.

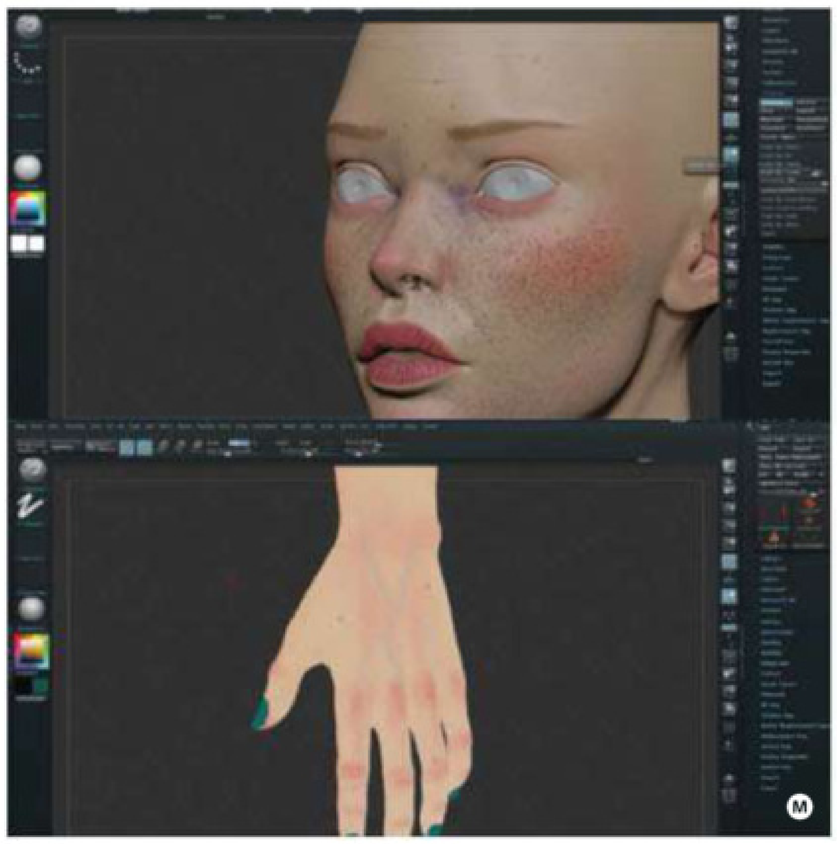


Ⓛ Lay down the main colours in ZBrush using PolyPaint

Ⓜ Apply your textures in ZBrush before exporting the information into Photoshop

Ⓝ Scales will be created on the unmasked parts of the model

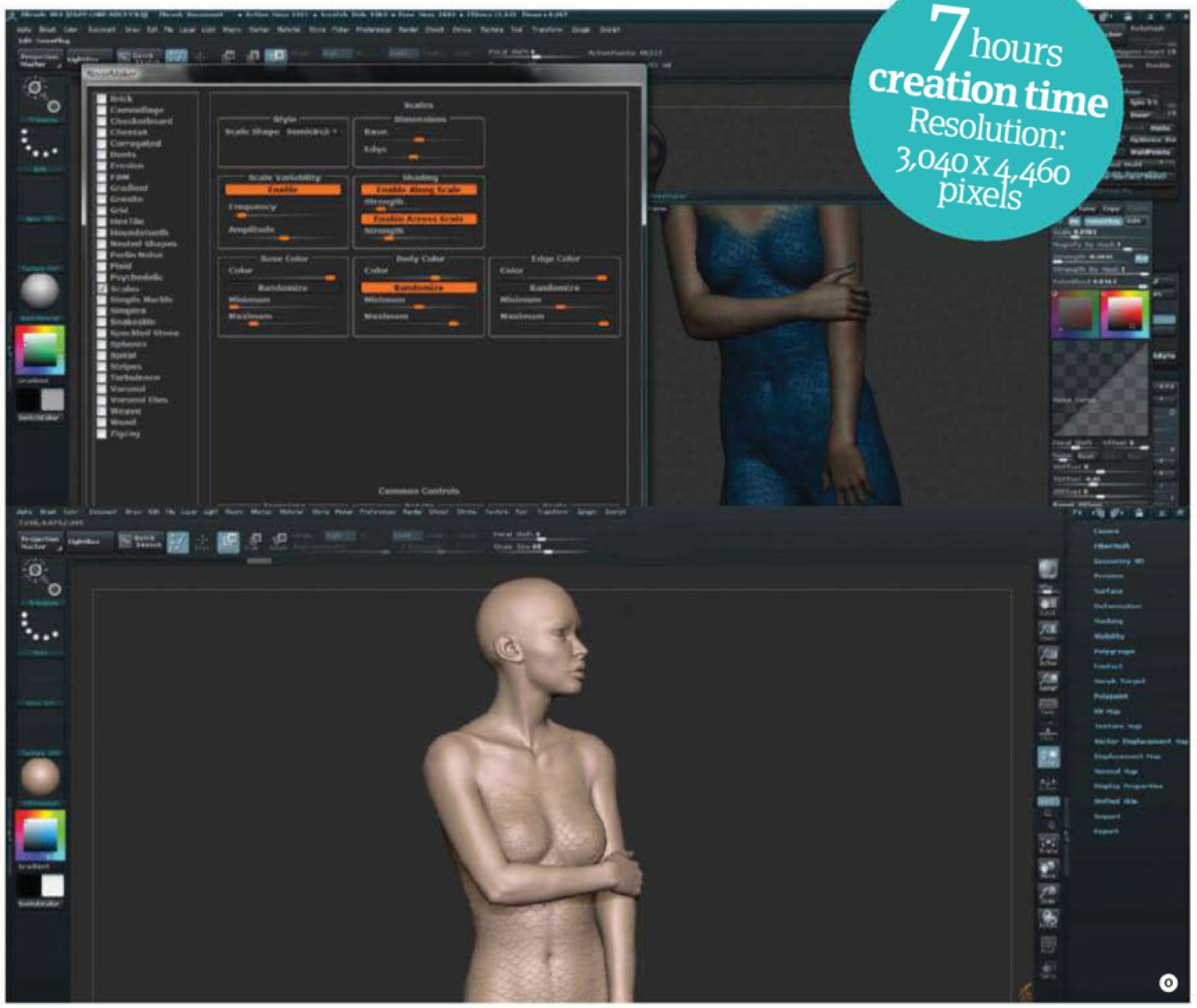
13 Skin tones and further details
With the Standard brush and a low RGB intensity I start to paint some areas in red, mainly on the hands, cheeks, nose and ears, using Symmetry. Once done, I disable the Symmetry and add some spots here and there to achieve a more natural finish. I also use a cyan to add subtle veins on the hands at this stage. Under Masking, click on Mask by Cavity and inverse your selection. Pick a dark red, choose a very low RGB intensity and fill the selection. Now export your texture at 8K and import it into a 2D application of your choice (Photoshop, for example) to add finer details Ⓜ.



14 Create the scales We could sculpt and paint each scale one by one, but that would take ages to complete on a project like this. Instead, we are going to use another – and much more efficient – technique. First of all, mask the areas you *don't* want to affect: head, shoulders, arms and hands. Make sure your model is on the highest subdivision level and under the Surface menu click on Noise. In the new window, click on NoisePlug to launch the NoiseMaker plug-in Ⓝ.

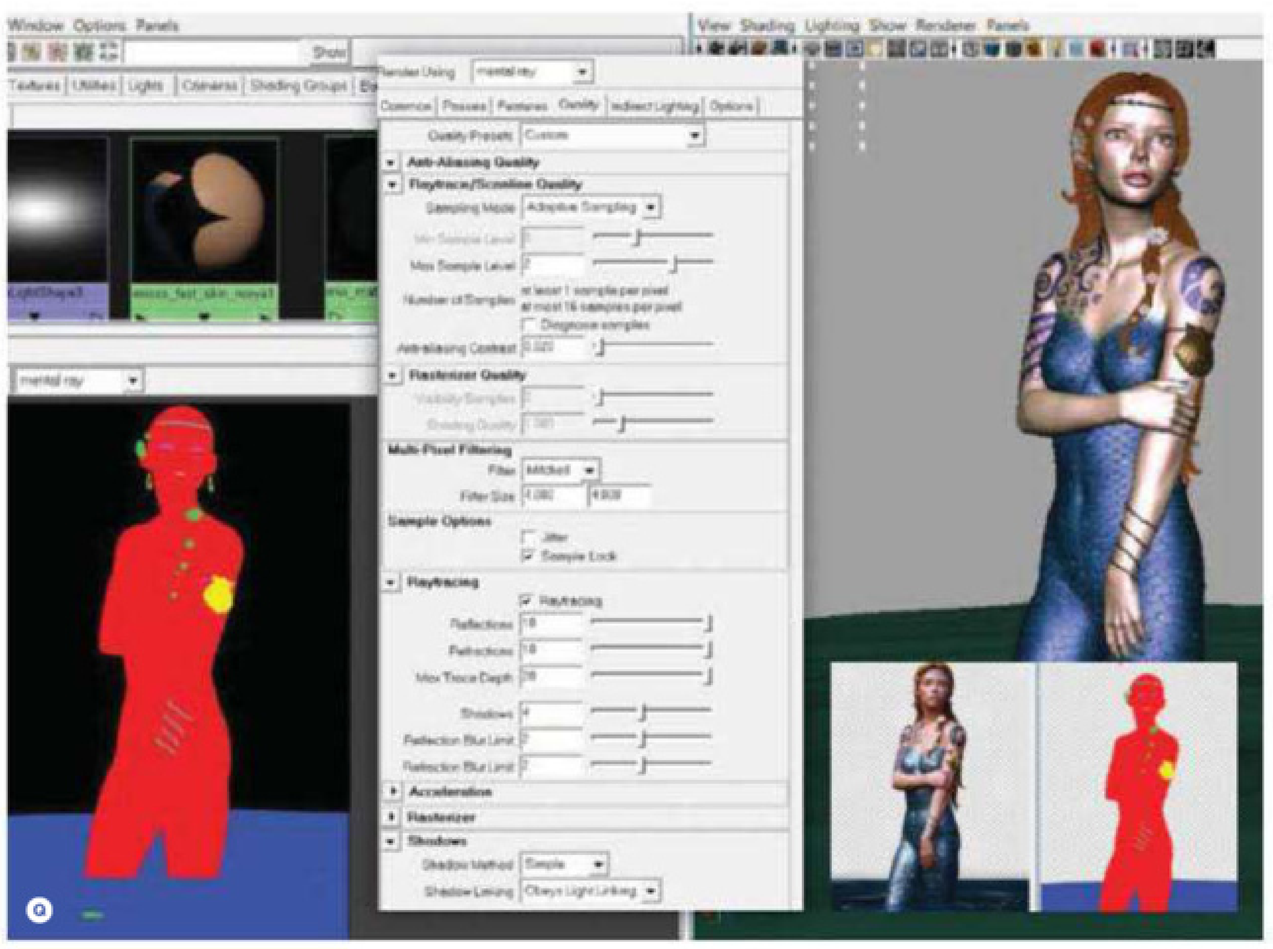
15 Perfect the unique scale features

Once inside NoiseMaker, tick the box named Scales on the left-hand side. The settings you might want to change first are Rotate and Scale. Make sure Scale Variability, Shading and Body Color are all enabled. You'll have to experiment with the various settings, so play around to get the best results. When you're happy, click OK. On the window beneath this you can play with the Strength, Scales and ColorBlend sliders to fine-tune the size, strength and colours of your mermaid scales. Once again, click OK when you're done. The last thing to do is apply your scales to your unmasked geometry. For this, simply click on Apply To Mesh. You can choose to do this either now or after posing – it depends on how you work best. I choose to pose first by going to Transpose Master – located in the ZPlugs menu – and using the Transpose line to place each part. Simply mask the areas you don't want to affect. Once done, import a plane as a new SubTool (Append>Plane3D). Divide it and simply draw large circles around the character to mimic the water O.



16 Import your model into Maya

I can now import into Maya and light my scene very simply, using three Area lights and one Spotlight. I create curves for the hair with the EPcurves tool and attach a default Maya Hair system to my curves. For the shading I assign an SSS_Fast_Skin shader to my character with my Color map plugged in the Overall and Epidermal slots. I also create a Specular map starting from my Color map as a base and plug it into the same shader in the Specular slot. For the water I use a simple mia_material_x shader. The flowers and the jewels in her head are all created in Maya P.



Post-production tips

Use the Material ID pass to select the element of your choice and to work on it without affecting anything else. For the background, I use a very dark blue with some fading effects and simply add several spots with a large brush. At the end I apply a soft grain to the image. This should complete your mermaid character! I really hope you've enjoyed this tutorial and have found it useful.

17 Rendering and post work

For once I've decided to render everything in one pass using mental ray – the only exception I make is to render a Materials ID Pass. I set my render to 3,000 x 4,500 pixels with high-quality settings and render the whole image. For the Materials ID pass, I simply assign a Surface shader to each element and hit Render again. I choose .tiff in 32-bits as the Image Output format. When all is done I can take everything into Photoshop (or software of your choice) to make colour corrections and final touches to the illustration Q.

O Here are my settings for the scales (screenshot supplied for you to zoom in)

P Import everything into Maya to light and shade your scene. I also create some hair elements using splines

Q Render your image with high-quality settings

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3DArtist

Back to basics

Van Halen eat your heart out: Jahirul Amin guides you through creating a jump animation

With the Disc

- Maya scene files • Scripts
- Video references • Final render
- Reference images

Maya

How to animate a jump

"A giant leap for geek-kind: Jahirul Amin helps you animate a jump"

In this issue's tutorial we will be creating a jump animation. This will involve acquainting ourselves further with many of the principles of animation that we've been looking at in recent issues. The jump itself will only last a few seconds, but achieving that brief movement in CG will necessitate a sensitive and skilled handling of timing, spacing, weight, drag, overlap, moving holds, squash, stretch, anticipation and arcs. As a result, it's a great exercise to flex your animation muscles.

Before the fun starts we need to go through the admin. I'm working in 25 frames per second using Maya, although the same techniques apply to any 3D package of choice. Second, I will begin the animation process using the pose-to-pose method, so my Default Out tangents are set to Stepped in my Animation Preferences. Third, I have the legs set to IK to enable us to have the feet planted on the floor, but the arms set to FK to take advantage of its naturally occurring arcs. There's an issue with the FK arms, because as we are using rotations at some point we could hit gimbal lock. This is where two axes sit on top of each other, leading us to lose one axis. If you want to do your best to minimise this sticky situation, get familiar with arm rotation to work out which rotation is going to work best. For what it's worth, I've set my rotate order as ZXY on the upper arm control. Last but not least, as far as admin goes, we have very kindly been given permission to use and tell you about the fantastic bhGhost onion-skinning tool created by Brian Horgan. Please check it out with his other impressive tools at www.graphite9.com.

As usual, at this point in the tutorial, I'm going to wax lyrical about the beauty and importance of getting good reference. Unfortunately we weren't able to reproduce

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the reference used in this article. However, do take a very good look at Eadweard Muybridge's *Human and Animal Locomotion* (1887) and there is reference aplenty on the net. During this exercise more than any other, I found myself getting up out of my chair to replicate the movement and jumping across the rug myself. This enabled me to really get a feel for where the weight came from during the movement, as well as which parts of the body led and which followed. Doing so also enabled me to see the subtler parts of the movement; for example the foot rolls back to anticipate the body moving forward. So I thoroughly recommend that you to take a jump – in the nicest possible way, of course.

Looking before we leap, let's reflect on our bouncing-ball exercise. There are many parallels to be found between our jumper and the bouncing ball exercise (issue 47), since the former is really only a bouncing ball with limbs. So one way to approach this exercise would be to animate a ball doing the jump, as the axis of the ball will represent the hips of the character. This obviously will be a rather rudimentary start that will require refining. However, the ball will provide us with the key poses, the arc that we'll work along, as well as indicate very clearly where we need squash and stretch. The timing will need a lot of work afterwards, as the ball basically travels much faster than our Box Boy model. The spacing is very helpful as we'll see that it'll be bunched up at the apex of the arc, but more spread out as the arc descends on either side.

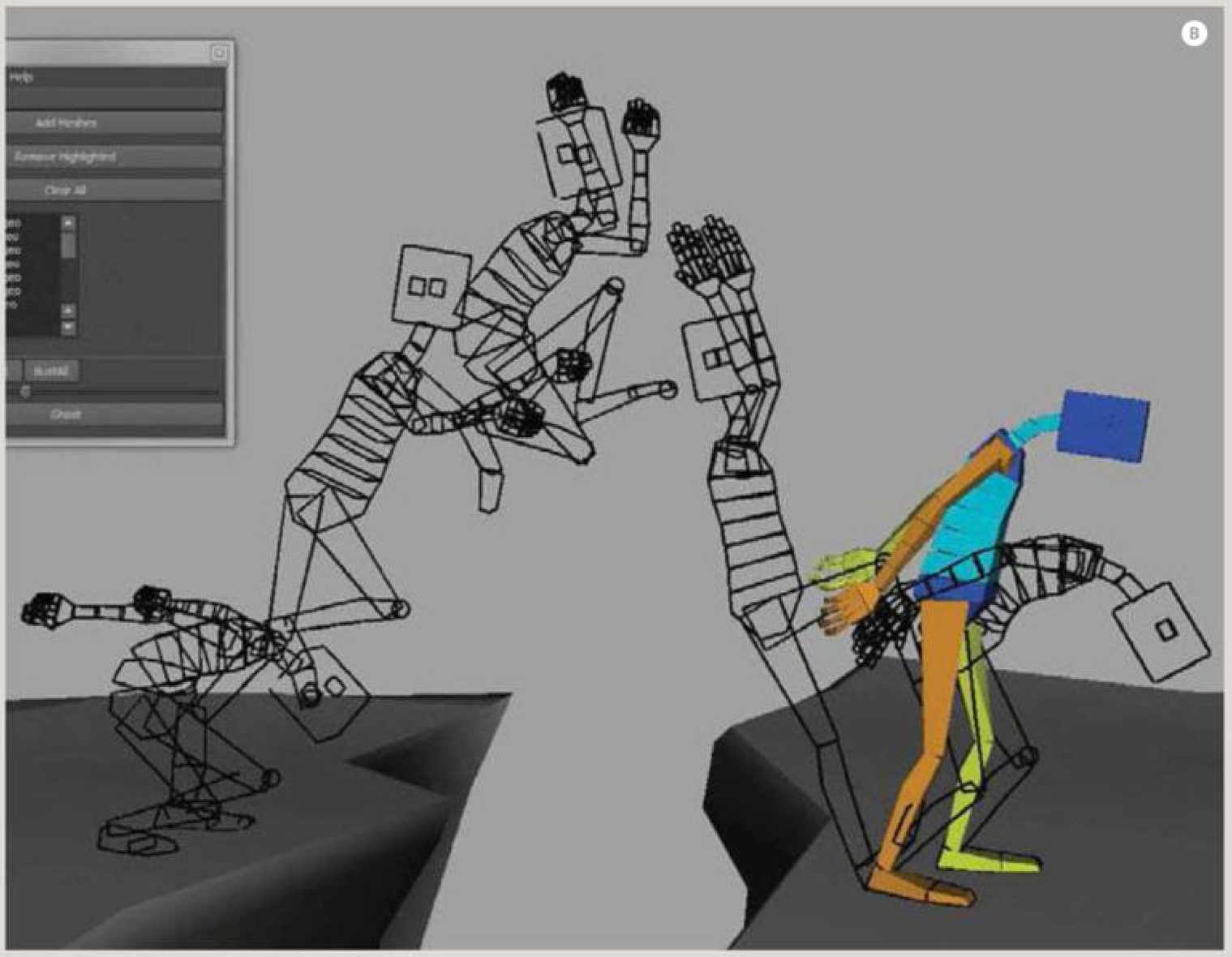
I took my animation of the ball bouncing from Maya into Kinovea and drew over it to position the limbs, head and neck. You'll find a video supporting this tutorial (02_bouncingBall_kinovea.mp4), which shows exactly how I did this.

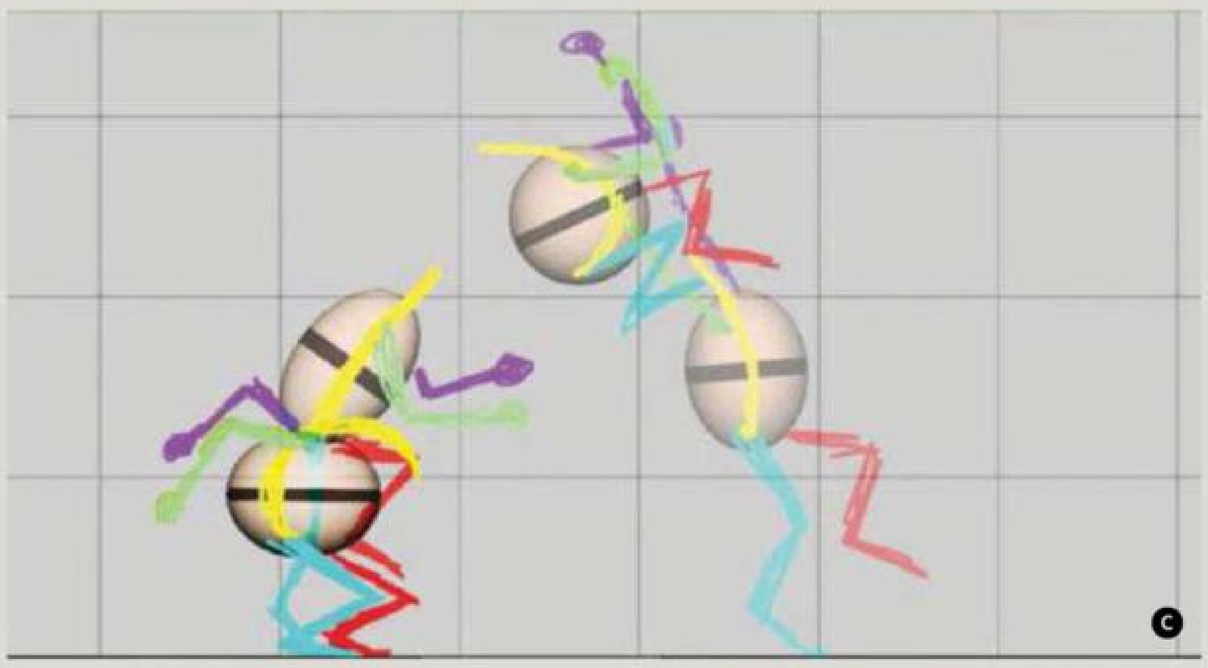
Now I'd like to focus on a few aspects of the process. We'll start our animation in Stepped mode to set clear and readable poses without getting bogged down in how we'll transit from one pose to the next, as this can confuse the issue. We'll remain in this mode until we're happy with the timing. Then we'll change our animation curves to Spline and work from the core out: hips, legs, spine and neck to arms. In Spline mode, we'll be adding in-between poses, which will also involve adding anticipation, drag, overlap and so on. At some stages we'll also be keying every one or two frames for a variety of reasons – one of which is that as the legs are in IK, we'll have to force the arcs.

Now let's look at squash and stretch. As mentioned, the bouncing ball will help us to know when to squash and when to stretch our jumping Box Boy. Because I have chosen to go for a semi-realistic rather than cartoony look to the jump, it's not the form of the character itself that's being either squashed or stretched, but the poses. So Box Boy's spine is compressed into a C shape before jumping and when recovering from the jump, then stretched high between those two positions. His form is being pushed to its limits, but he is not gaining or losing length as he might in a more cartoon-style piece. Creating these extreme poses and playing with the silhouette of the character means we are adding more contrast and appeal to the overall animation.

Staying with adding appeal to your work, it may sometimes be necessary to push some poses beyond the boundaries of realism: what can seem extreme in a frozen frame may look totally natural in motion. For instance, as the jumper hits the ground his knees bend but his head really pulls back to keep the arc and the motion flowing smoothly. The same concept has been applied to the fingers that whip back and forth as Box Boy lands and brings his arms gradually back to hanging by his sides in the standing pose.

Finally, we'll turn to Moving Holds. While 2D artists have the luxury of holding a frame without losing their audience's belief, any break in motion in 3D will mean our character dies and the illustration is broken. To make Box Boy hit the ground without stopping dead, we'll use Moving Holds. This is the technique where movement continues in a very subtle way, such as the chest rising and falling with breath, or the arms slightly swaying.



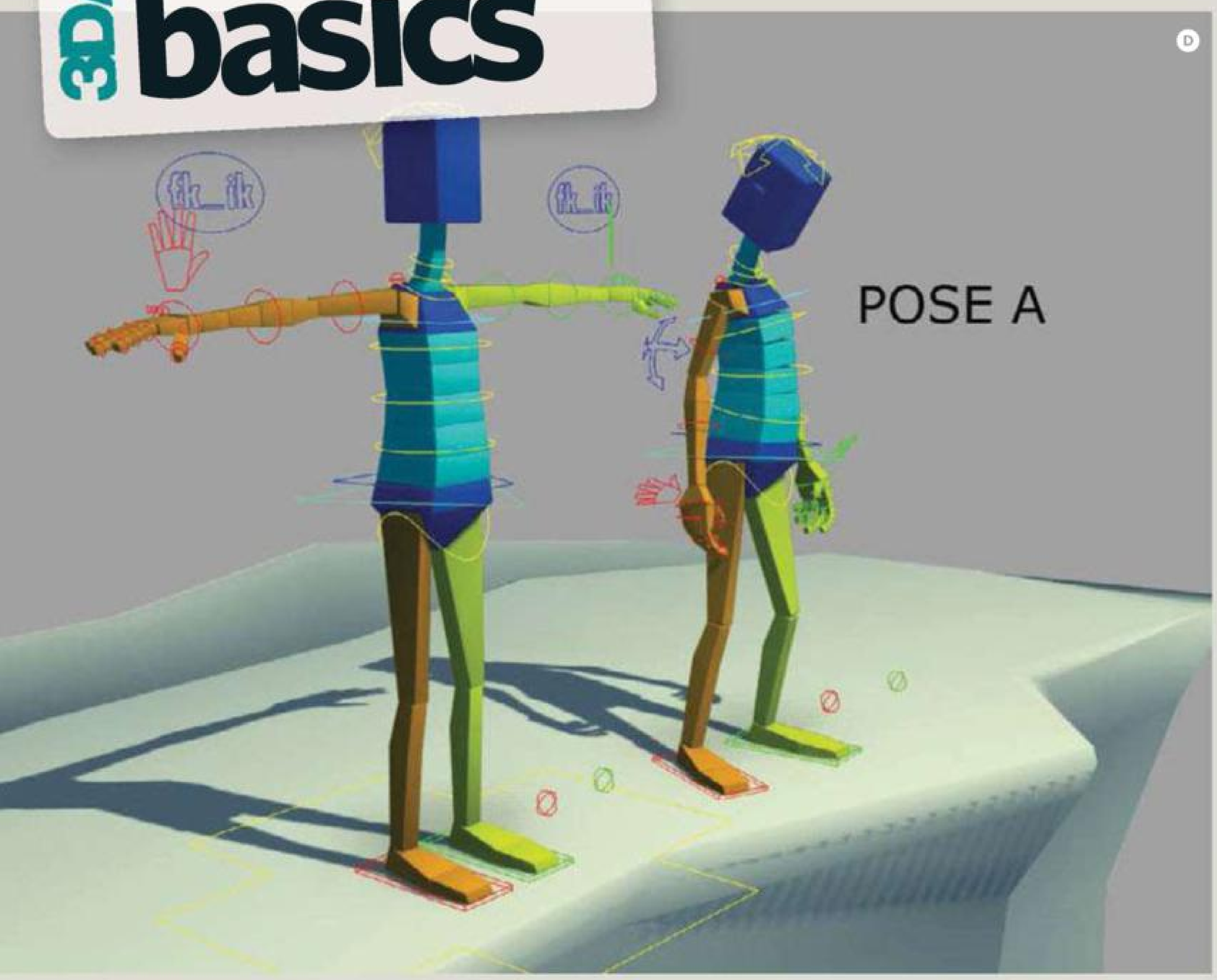


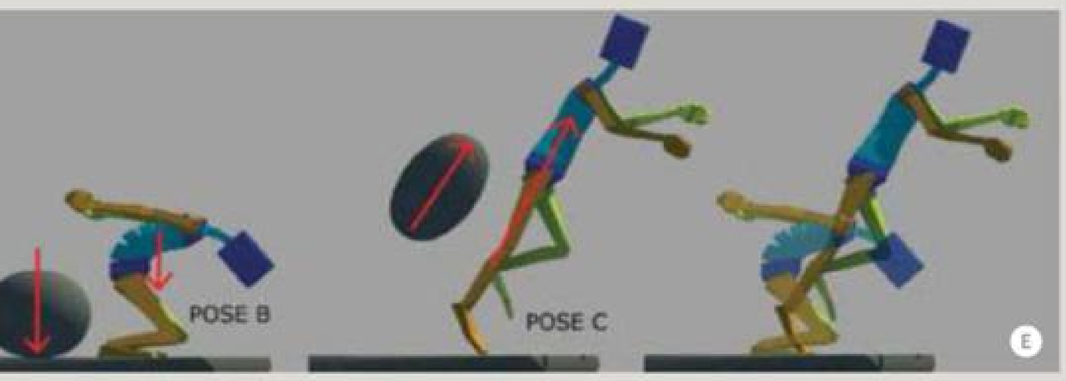
A The finished jump in action

B Using the onion-skinning features of the bhGhost tool

C Working over the bouncing ball animation to use as reference

Back to basics





+ Prepare to lift off...

01 Loosen things up

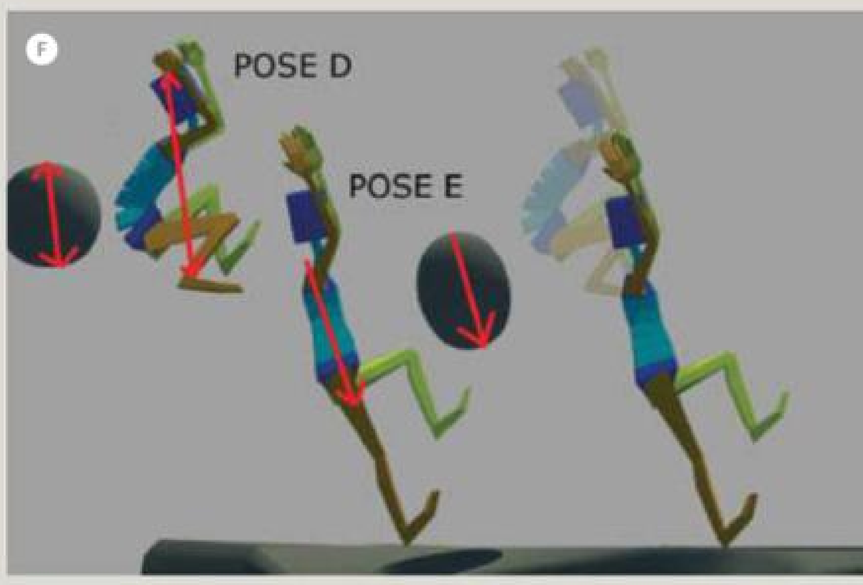
Open up 00_start.ma (supplied) to find the Box Boy rig and a rough environment. The environment is in a layer called 'environment_geo' so we can show and hide it if needed. Let's create our first pose and make the character a little more comfortable. Relax his arms and fingers, add a slight angle to his hips and oppose that angle in the shoulders. Move his hips to rest slightly over one leg and rotate his head so it seems as if he is looking at the gap in front of him. Also, put a slight angle in his feet and bend in his knees – otherwise they'll feel too tense D.

02 Create the squash & stretch poses

Now we'll create the first two of our extreme poses: squashed and stretched. Begin with the former by really compressing his body down. Try to get a huge C-shape running down the spine, up the neck and head, then swing the arms out as we prepare to push him off. For the stretched pose, try to straighten the leg and start bringing those arms through. Have the back straighter, as this will produce a nice contrast to the C-shaped squashed pose E.

03 The apex & landing

Once he is off the ground and in the air, try to think about what is leading and what is following. Rotate the core (here, the hips) as you would the bouncing ball and think about how the speed of him reaching the apex of the arc should be the same as the speed of him coming back down again. As a result, the spacing should be more bunched at the peak of the jump and spread apart further either side of the apex as he pushes off and lands. Delay one leg and offset the arms slightly so we don't have any twinning issues. At this stage you can already start to indicate the effects of drag on the fingers and toes as he begins to fall, if you wish F.

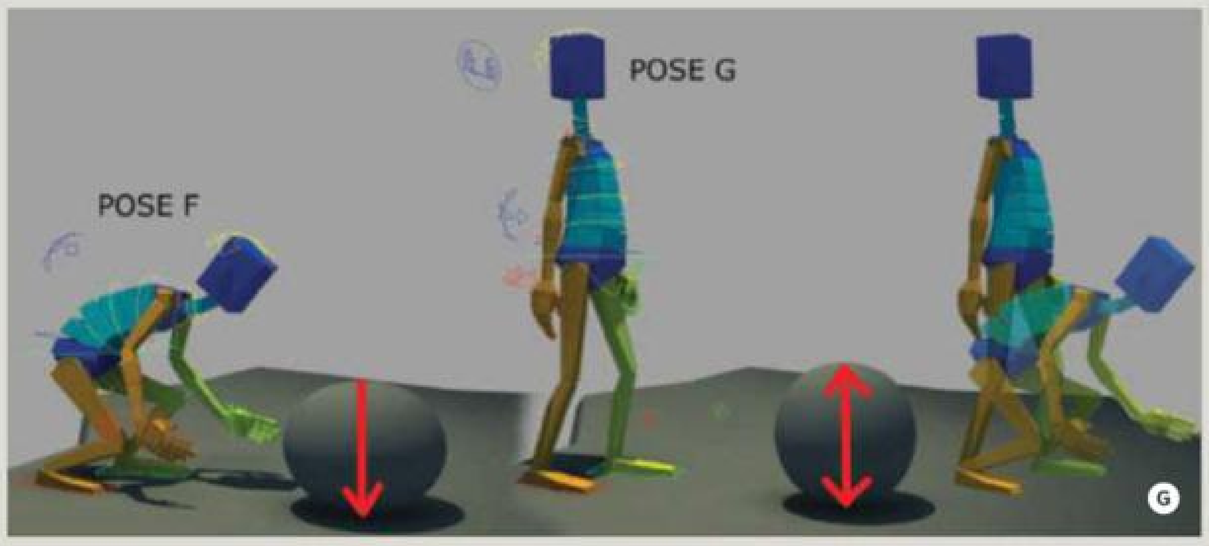


See the forest and the trees

Getting an animation like this right is a time-consuming process. Sometimes you may feel like you haven't moved on very far at all and no forest is visible for all the darn trees. However, a simple solution is to save multiple files throughout the process. This means you'll be able to compare your before and after shots and perhaps give yourself some pleasant surprises.

04 Make a safe landing

As he lands, have him go down as you would squash the bouncing ball. Really compress his body to take the impact and push the spine into a strong C shape to once more contrast with the previous stretched pose and its straight spine. Going from these bigger to smaller shapes and back again will also add to the appeal of the animation. Really push these early poses, making sure they are as clear as can be. Spend time making your poses fully readable and, if needed, create a playblast and draw over it in Kinovea (www.kinovea.org) so you are not restricted by a rig G.



D Get him a little more prepared for the occasion

E The squashed and stretched poses as Box Boy lifts off

F What goes up must always come down

G The landing squashed pose

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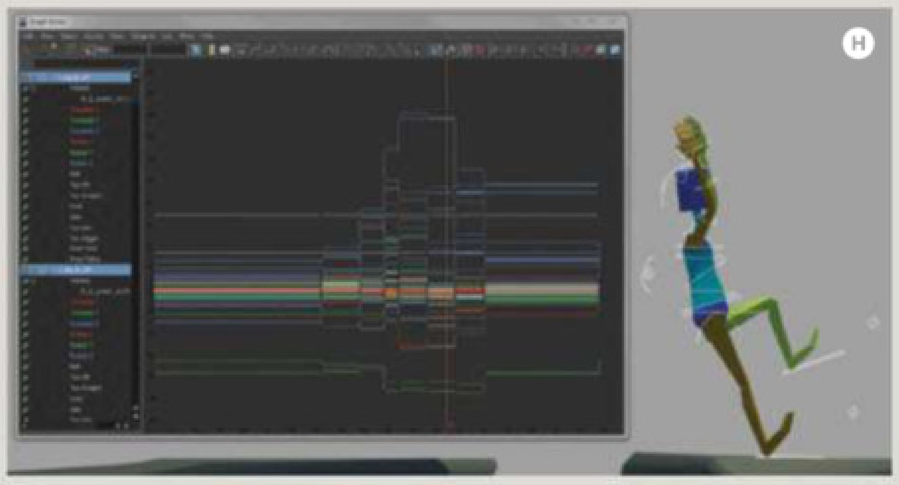
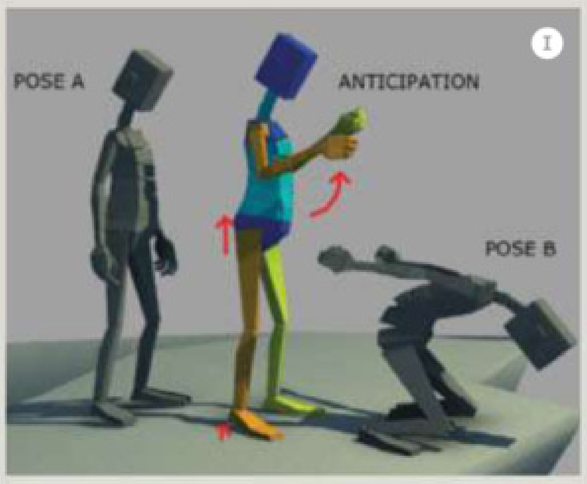
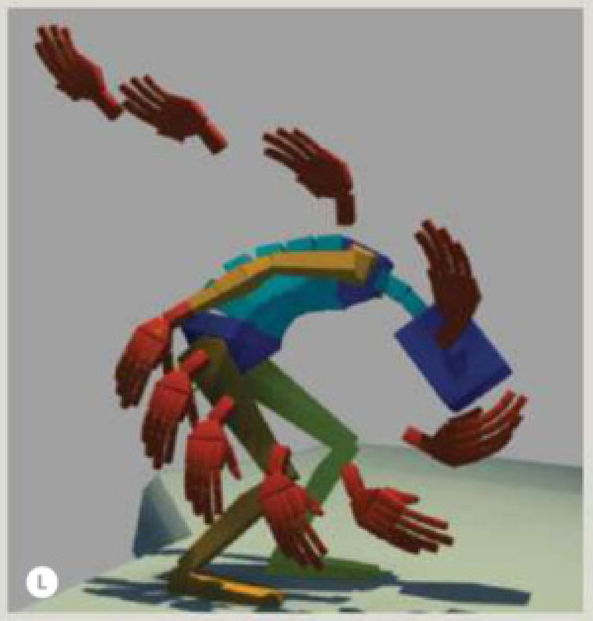






05 Rework the timing

So far, if we follow the timing set by our bouncing ball animation, everything will be a bit too fast. Since we are using Stepped mode, we can easily go into the Graph Editor or the Dopesheet and start pushing these keys around in order to re-time the shot. When you are all set, select all the curves in the Graph Editor for every control and go to Tangents>Auto or Spline. Also go to Window>Settings/Preferences> Preferences and change the Default Out tangent to Auto or Spline in the Animation tab. If you hit Play now you may have quite a flat, weightless animation H.

06 Anticipation & weight

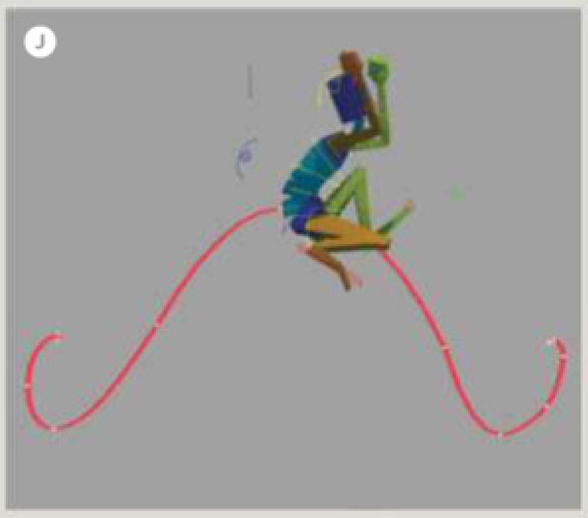
Once the main poses are in, we can start adding some anticipation. Place a key between pose A and B, then slightly lift the character up on the balls of his feet. Have him bring his arms up also, ready to swing them back into the extreme, squashed pose. Then, as he lands on the other side of the jump, push him down further than the squashed pose and as his hips lift up have his spine continue to go down. The opposing action here will help soften the potential rigidity of him standing up as one lump mass I.

07 Arcs, arcs & more arcs

At this stage, we should really start thinking about getting our arcs as clean as possible. Again, we'll work from the core outwards, as changes to that region will have a knock-on effect on all four limbs and the torso. Try to mimic the parabola that we would expect to see on a bouncing ball. To help with this, select the root_ctrl and go to Animate>Create Editable Motion Trail. Once you have the hips worked out, move to the feet. As they are set to IK, you will most probably need to set quite a few more extra keys to reduce the linear transition from one key to another. This will be created by default J.

08 Focus in on areas

Animating the entire character at once can sometimes become overwhelming and fixing one area can lead to issues in another.



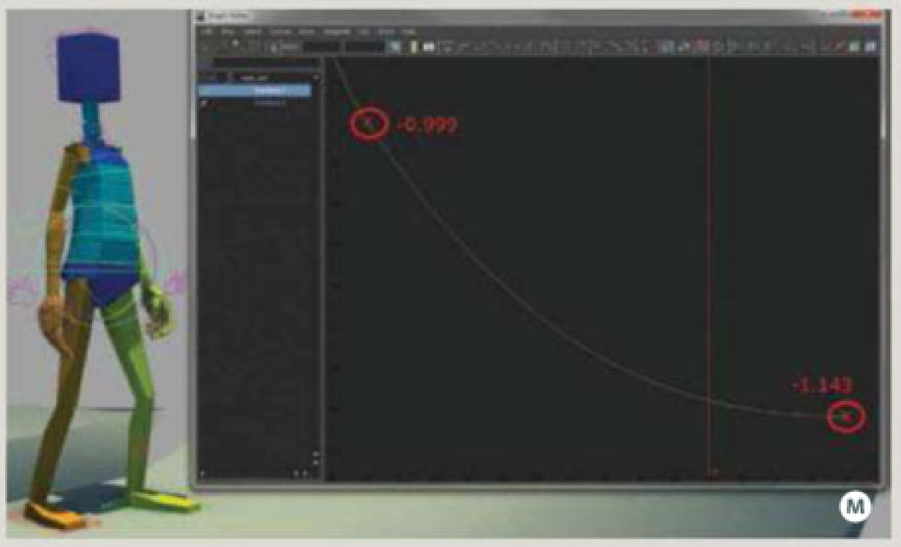
Having the ability to hide parts of the geometry can really help you focus on the areas that need cleaning up. For example, you may want to get the spine working well without viewing how the arms are affected. Then you can unhide the arms and focus on them, knowing that the spine is how you want it. If a Hide/Unhide feature is not part of the rig, you can generally achieve the same effect by selecting the geometry that you want to hide and go to Create>Sets>Quick Select Set. You can then easily find that geometry in the Outliner and hit Cmd/Ctrl+H to hide the pieces. When you want to reveal them again, select them from under the set in the Outliner and hit Shift+H K.

09 Drag & overlap

To make the jump more fluid, let's apply some drag and overlap. Start by adding some delay to the spine, neck and head. Offset each section by a couple of frames and you should quickly get a more natural-looking animation. Work your way down the arms to the hands. For this exercise I've also added drag to the fingers so they flow into the path of action. Also add some drag and overlap to the toes as they go through the jump. Then on the land, have them slam down in a couple frames to help bring some weight and impact to the landing L.

10 Use Moving Holds

Right now, when our character hits his final pose, he stops dead. This really appears very CG, so to reduce this we'll add a Moving Hold. To do this, copy the same pose another ten frames ahead, then make some minor changes but try to have the movement flow in the direction of the pose before. If the arm is swinging from left screen to right screen, continue that movement from left to right. I have made this quite subtle, but feel free to experiment and see what works best for you M.



H Re-time the animation using the Graph Editor

I Adding some anticipation will enable the audience to prepare for the action they're about to see

J Arcs are stunning as well as naturally occurring – make sure you get them in

K Hiding parts of the geometry can help you focus closely

L Use the tools to check your arcs

M Just a small movement can help keep the character alive

Motion Trail a vertex

When we create a Motion Trail on a control, we want to make sure that it's creating the trail from the correct place. For example, if we make the trail for the hips, it will work fine as we want it to happen from the control's centre. However, if we create it on the foot control, we don't get the right result. As we use the Roll attribute on the foot, the geometry actually pulls away from the control and so the trail is incorrect. Luckily for us a colleague of mine, Constantinos Glynos, has kindly created a Python script, CG_VertexMotionTrail_V2.py (supplied), that will enable you to create a Motion Trail on a selected vertex. I like to view the arcs being created in places such as the tip of the fingers or the end of a toe, so this tool enables me to do that with more accuracy and confidence.

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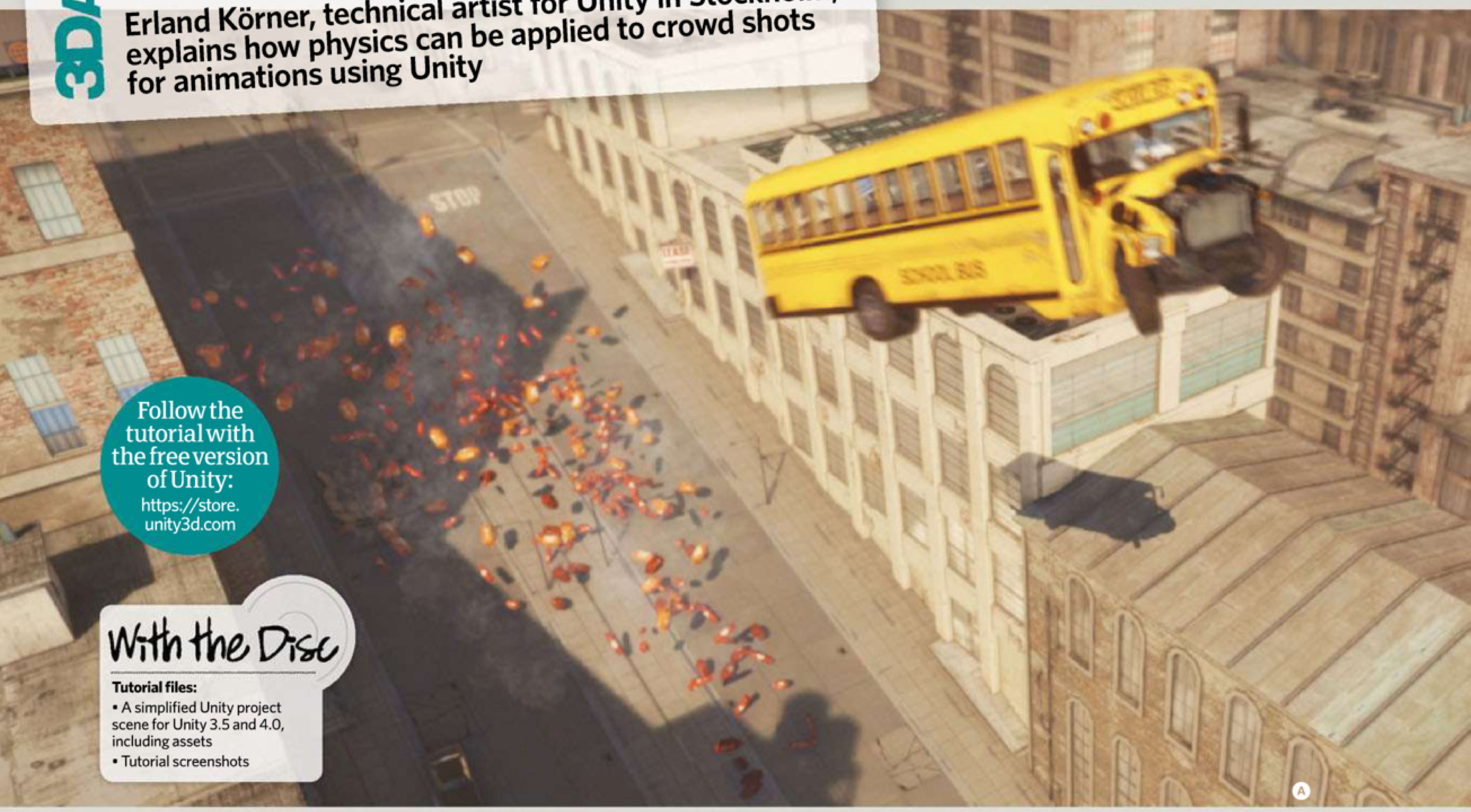
Masterclass

Erland Körner, technical artist for Unity in Stockholm, explains how physics can be applied to crowd shots for animations using Unity



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With the Disc

Tutorial files:

- A simplified Unity project scene for Unity 3.5 and 4.0, including assets
- Tutorial screenshots

Master Rigidbody simulation

"Erland re-creates the canister stampede from Passion Pictures' 'The Butterfly Effect', using NVIDIA PhysX real-time physics in Unity"

Using the built-in NVIDIA PhysX engine in Unity, we were able to develop a scene in 'The Butterfly Effect' animation (see page 26) where masses of canisters bounce down a sloped street in San Francisco.

This tutorial will cover how to go about setting up physics by re-creating a shot from the film. To follow this you will need some fundamental understanding of Unity, and although scripting skills open more abilities, it isn't a requirement for this tutorial. Unity Free and Pro trial versions are available from the Unity website, at www.unity3d.com.

A physics simulation is typically referred to as a 'sandbox', because only the selected – and preferably lowest possible – amount of objects within the physics framework are influenced. The physics engine simulates how objects impact one another when forces like gravity or momentum apply.

Each sandbox is unique, with different combinations and complexities working in various situations. 'The Butterfly Effect' shot asked for a non-interactive approach and benefitted from locked-down camera angles, yet there were a large amount of objects simulated. Performance is considered crucial for smooth simulations and also to work effectively in the editor. Therefore, unless running a heavyweight machine with an abundance of processing power, it's recommended to gradually and carefully increase complexity to your needs during development – rather than sketching out heavy simulations and being forced to reduce complexity.

Most simulations are an illusion of complexity. Colliders are simple primitives compared to the rendered meshes, which play little importance in the actual simulation. Unity offers a range of Collider types and it's easy to acquaint yourself with them by replacing (reapplying) them to any object. With a little experience you'll learn to envision rendered meshes as primitive Colliders, or a collection of multiple Colliders – so-called Compound Colliders. By creating child objects of the parent object, you can also add primitive Colliders to each child object, which can then be changed independently.

It can be particularly hard to discern the approximated Collision Detection with rapidly moving Dynamic objects. In certain cases one or multiple primitive Colliders will not sufficiently substitute enough detail. In this case, a more costly (performance-wise) Mesh Collider may be required. This can be used for concave- or organic-detailed objects, but it's rare. Mesh Colliders provide the most accurate Collision Detection, with the exception of surface smoothness, which a primitive sphere – or canister Collider – typically does

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Unity's Layer-Based Collision Detection

Using Unity's Layer-Based Collision Detection you can categorise Rigidbody objects in a matrix by attaching them to specific layers. This opens many possibilities to make a lot more complex and selective Collisions with advanced exceptions. Consequently you can create workarounds to improve CPU cycles for calculations.

better. A Mesh Collider's geometry demands smooth tessellation to replicate the primitive's collision surface. Also, the Mesh Collider's poly count is limited to 255 triangles, so consider this to be the level of details (LoDs). Keep the highest amount of collision detail where it's registered.

Rigidbodies enable objects to be controlled by physics and move as a result of collisions or force, whereas Colliders enable objects to impact one another. A Collider missing a Rigidbody naturally becomes static, so it's most suitable for geometry, such as environments, and preferably remains frozen. If you need to animate a physical object, make it a Kinematic Rigidbody (Rigidbody.isKinematic) that enables you to manipulate the Transform component.

Another important thing to be aware of is that the mass of your GameObject is a lot less relevant than its actual size or scale. Be careful and make sure you check through the Content Scale in case you notice calculations behaving oddly, such as not colliding properly, floating, jittering or moving slowly. Also, adding variety to the scale of instances and parents can cause erratic behaviour and performance hits. All Transform Scale Axes are kept correctly uniform at 1 unit; however, the entire scene's scale could be wrong with giant or microscopic cars or characters.

It's tempting to keep values in the simulation related to reality. Nevertheless, the masses of Rigidbodies are relative to one another. This means a car could have the mass of 1 and a rubber ball 0.001. Be mindful that high Mass values beyond 100 units can generate glitches in your simulations, so it's best to run the simulation and observe how the Rigidbodies affect one another. Fall speed – or Damping – is determined with the Drag value, whereas Angular Drag controls the Rotational Speed. This in turn breaks up the visual symmetry and stiffness of the object's movement.

Physics materials adjust the friction, bounciness and softness of the Rigidbodies. Their Dynamic and Static Friction properties are really essential to master, as in a sense they form a bridge between Static (sleeping) and Dynamic Rigidbodies.

When a Rigidbody is still, or moves slowly, it rests and then eventually sleeps. This mode triggers an automatic optimisation by disabling collision and simulations. You can find the Sleep threshold located in the Physics Manager. To awaken your Rigidbodies, they either need to collide with other Rigidbodies or be affected by various forces. This essentially means applying constant forces that push the Rigidbodies will keep them active, unless interfering with scripted events. And now, with all these considerations in mind, let's begin.

A Learn to replicate a shot from 'The Butterfly Effect', complete with dozens of rolling canister objects

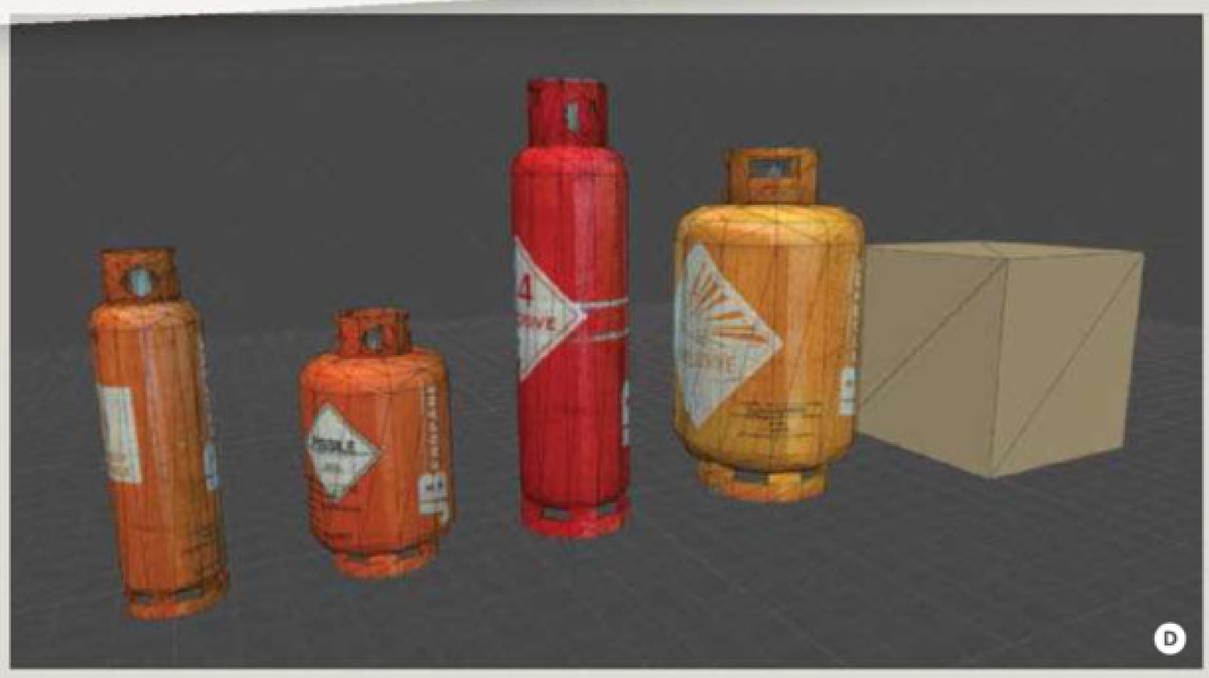
B A brief shot in the Editor Scene view without particles and post effects

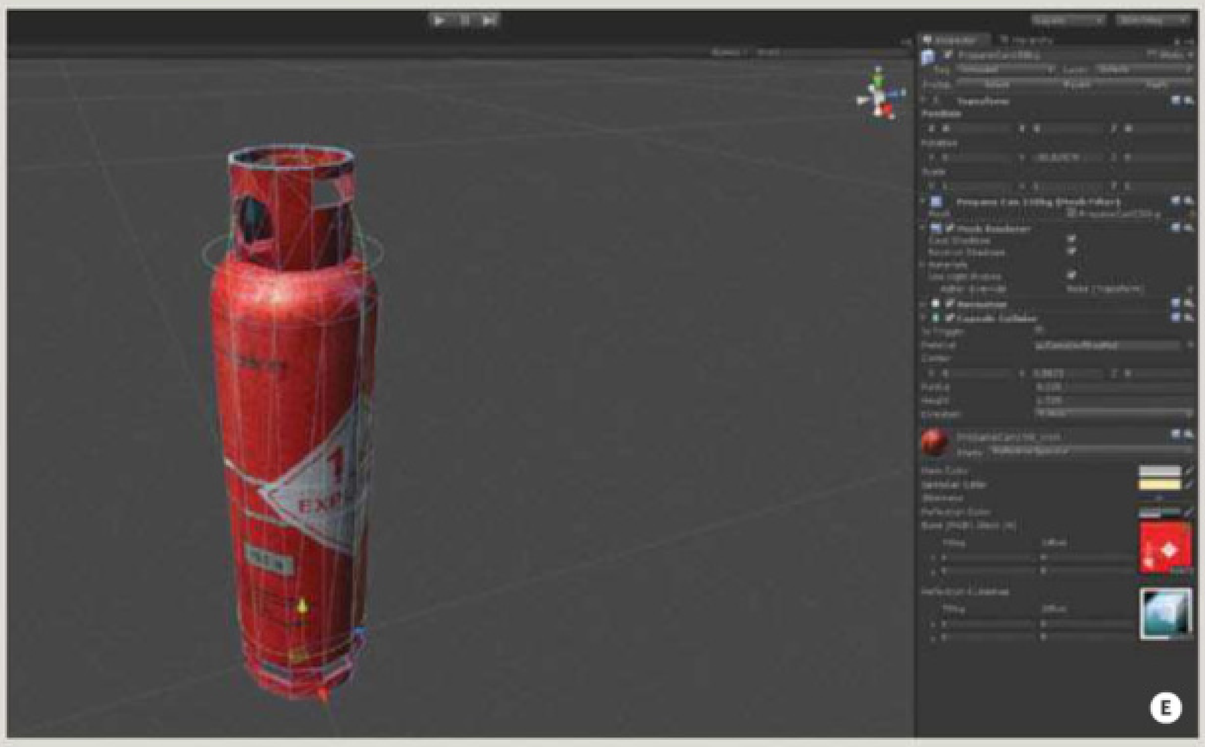
C Using multiple Viewports will enable you to pan and inspect details in the editor while the Camera view loops the shot

Create Rigidbody mayhem!

01 Set scale and units

It's essential to set the actual Content Scale accurately. The physics engine evaluates volume, while microscopic and gigantic objects act differently in physical simulations. The simulations behave according to sizes and different scales on instances or parents can affect performance. Maintain the Scale values uniformly at 1, then freeze the Scale in your 3D program or in the object's Import settings in Unity. The Unity mesh cube primitive is 1 x 1 x 1m (equal to 1 x 1 x 1 Unity units). Place it next to the content to compare, while remembering to use Prefabs early on to facilitate instancing and the propagation of the Physics values D.





02 Use primitive Colliders

The Collider component defines the physical shape of the GameObject. Three components are used in this shot: Box Collider, Capsule Collider and Mesh Collider (Component>Physics>...). The Capsule Collider is an obvious choice for canisters. Fast movement helps to conceal that the capsule approximates the shape. It's easier to notice gaps and floating objects than interpenetrations, so put collision surfaces close or inside the mesh shape. The road and curbs are substituted with cube primitives, so scale and hide them just below the visible surface, and then disable them rendering. Large and thin volumes can cause Rigidbodies to pass right through or jitter E.

03 Add complexity with Mesh Colliders

As car contours have multiple diagonal angles it's hard to approximate them with few primitives. Instead, apply the Mesh Collider (go to Component>Physics> Mesh Collider or Import Settings) and replace the default shape with optimised bare-minimum geometry. This will greatly help the overall performance. Mesh Colliders are more expensive than primitive Colliders, so they are mainly used for complex static objects – irregular, organic environment props such as rocks, trees and so on. A unique advantage is that Mesh Colliders are subject to backface culling, so they are usable for one-sided force fields F.

04 Rigidbody physics

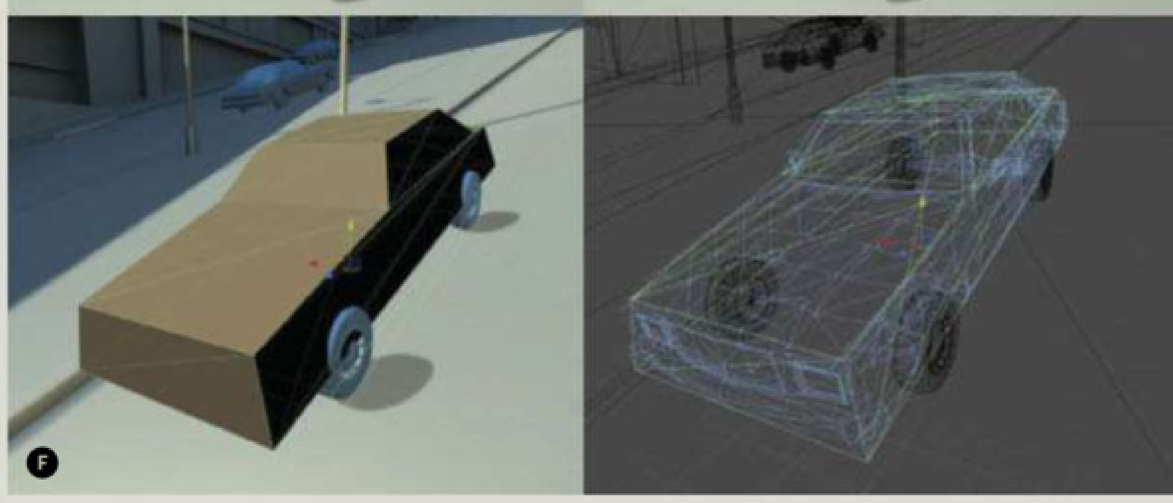
The Rigidbody component (Components>Physics>Rigidbody) provides mass and drag, enabling the lifeless canisters to be influenced by physics, gravity and forces. Rigidbodies fall, collide and a heavier Rigidbody pushes a lighter one. Mass is most significant when relative between other Rigidbodies. It doesn't affect fall speed, but air resistance (Drag) does. A low amount can make canisters appear heavier and increasing that number will reduce their weight. If you notice fast canisters interpenetrating, change the Collision Detection to Continuous Dynamic Collision – practically compensating for accuracy in reaction time to decrease performance G.

05 Bounce and slide

For this shot it's important to avoid canisters rolling. Apply Physics Material (Assets>Create>Physic Material) on the

Track performance with the Unity Profiler

Remember to occasionally study performance in the Unity Profiler, which tracks the CPU and Physics section. Analysing the performance can give you effective hints on where to optimise. There are countless optimisations (or cheats) to improve performance in heavy simulations. In the Profiler you can follow and get a good overview of the active and sleeping Rigidbodies, the number of contact points between Colliders, the number of Static or Dynamic Colliders and so on.



D A standard primitive placed next to other content to roughly check the scales

E A canister with a Capsule Collider component and a gizmo estimated around the volume

F A simplified mesh created in a 3D program, then attached as a Collider to the car objects

G The Rigidbody physics provide the ability to roll the canisters down the street

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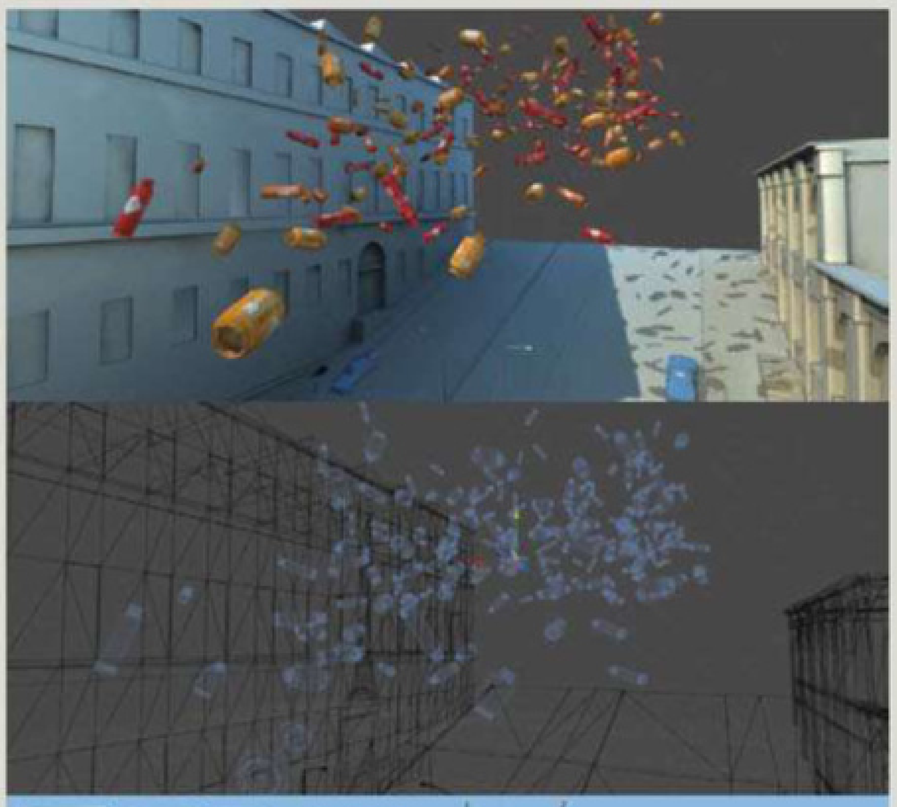

H The Physics Manager has global physics-related data. Attributes of Physics Material provide detailed control of bounce and friction effects

I A large crowd of canisters, cloned and ready to fall

J Herding the canisters down the street

K Making the canisters slam into rattling cars gives secondary movement and more detail

L The final flood of canisters, which bounce and collide down the street to eventually pile up at the bottom of the hill

canisters and the World Material to Default Physics Material in the Physics Manager (Edit>Project Settings>Physics). In both Physics Materials enter high Bounce values then boost Bounce by switching the Bounce Combine to Multiply. Increase the Bounce Threshold (Physics Manager) to prevent canisters bouncing when resting.
Friction defines the amount of sliding: 0 is a soapy, slippery surface. The metal canisters should slide (low value) against the coarse asphalt or World Material (high value) H.

06 Cluster the canisters

We can now set up the canister cloud, so we'll need to create Prefabs before continuing any further. Cluster the different randomly rotated canisters a few metres apart, then repeatedly duplicate, move and rotate them. Add about 50 canisters and keep your eyes peeled for overlapping – though helpfully the simulation may forcefully split them apart if canisters intersect on the first frame. Place the cluster at the top of the street, and then play the scene. You can smoothen any jerky movements by tweaking the Rigidbody. interpolation parameter I.

07 Apply some force

The canisters now fall and collide with the environment, eventually making their way down the street. The Constant Force component (Component>Physics> Constant Force) helps to accelerate and herd the canisters. Apply by selecting the canister Rigidbodies, then punch in values to the Z-axis, as that's the direction of the street. This force is per-Rigidbody and constant, meaning that the canisters are constantly affected unless values are animated or scripted to gradually decrease. Be careful, though: torque can cause canisters to climb walls with friction J.

08 Spring Joints and cars

The cars in the path of the canisters should wobble when they are slammed, so apply the Spring Joints component (Component>Physics>Spring Joint) to the car body. Leave the Connected Body slot empty to fix one end of the spring. Remove the rubber-band-and-slingshot effect by locking all Constraints Position Axis and Y Rotation of the Rigidbody. Limit the Minimum and Maximum Distance to 0 on the Spring Joint, increase Mass and improve the sturdiness and bounce by increasing Damping. Drag and drop canisters in the scene view and tweak until right K.

09 Finalise and polish

The best advice is to continuously run the Rigidbody simulation. It's effective to adjust parameters while playing the scene to spot the updates. You can observe the movement of Rigidbodies in slow motion by adjusting the Timescale value in Edit>Project Settings>Time L.

Physics Manager opens up World Properties

If you experience low performance while all canisters are in motion, try reducing the Solver Iteration Count in the Physics Manager. It gives less accuracy, but improves performance. Its gravity, thresholds and velocities are also valuable to get experienced with.

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Questions & answers

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The advisors

Blender

Filippo Veniero
www.ifilgood.it

Freelance artist and open-source software fan Filippo likes to work with simple objects, focusing on details, ambience and lighting to achieve realistic results

3ds Max, V-Ray

Viktor Fretyán
http://radicjoe.cgsociety.org

Viktor is an architect from Budapest, currently residing in Norway. He works at a visualisation company called MIR, where he creates images for future architecture

With the Disc

- Source file
- Render tests
- Video tutorial file

Blender

Blender smoke FX

“How can I create smoke simulations in Blender 2.64?”

In this tutorial we will work with Blender's smoke simulator, showing how to replicate and render smoke and flames. The victim of the experiment will be Blender's in-built monkey, Suzanne (sorry Suzanne!).

Blender's smoke simulation is based on the paper 'Wavelet Turbulence for Fluid Simulation' (implemented in Blender by Daniel Genrich and Miika Hamalainen). This algorithm enables you to add high-resolution detail as a post-processing step, which means more details in a reasonable simulation time.

Keep in mind, however, that Blender is in continuous development and that new tools and features will be added in future versions (such as the Dynamic Domain), so this tutorial is just a starting point for you to further your explorations.

Smoke simulation is similar to the fluid simulation (covered in issue 48). We'll need a domain, an Emitter object and a particles system that gives the smoke initial speed. The algorithm wraps smoke voxels around the particles. Voxels follow individual particles during their life and evolve freely at the particles' death. The most important settings are:

- **Resolution** – how detailed the smoke is.
- **Time Scale** – this enables us to have a slow-motion effect that simulates large explosions, keeping a small domain.
- **Temperature and Density** – how fast the smoke rises.
- **Dissolve** – this indicates the dispersion velocity of the smoke.
- **Border Collision** – this enables us to simulate the domain as closed (smoke in a room) or open (an explosion in a field).
- **Vorticity** – higher values will give smoke more swirls. In the high-resolution option we have two different methods to handle the details: an algorithm that uses FFT (Fast Fourier Transform) and one using Wavelet transform. Without getting too specific, FFT gives better results if you want flames, while the Wavelet works better on smoke.

The smoke Field Weights is also very important as it enables us to determine the influence of the forces acting on the simulation. You can add a Wind object or Turbulence to the domain as well as determine how the smoke and the flames are subject to those forces. For this tutorial, unlike in previous issues, we'll use the Blender internal render engine. (Cycles does not currently support volumetrics, but this is in development!)

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Sculptris

Timur 'Taron' Baysal
www.taron.de

Taron is a German-born freelance artist based in Los Angeles, where he has worked as a lead artist, animation supervisor and head of R&D at various studios

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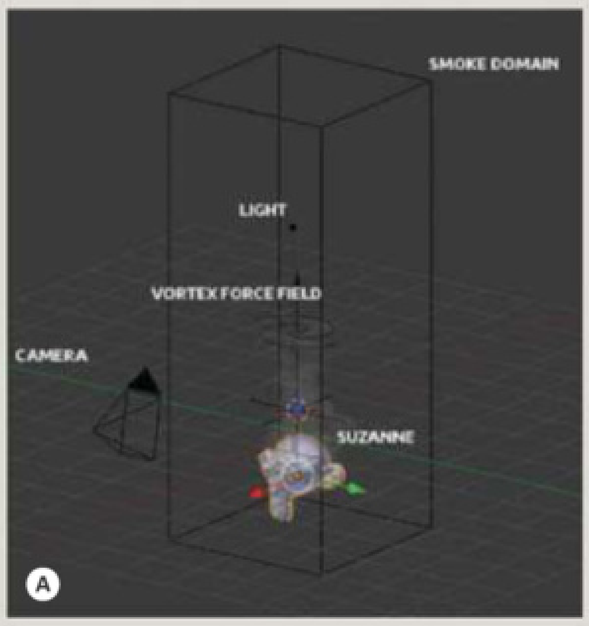
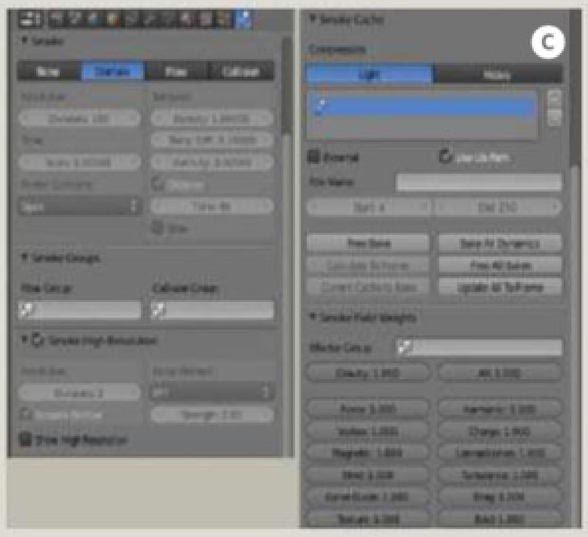


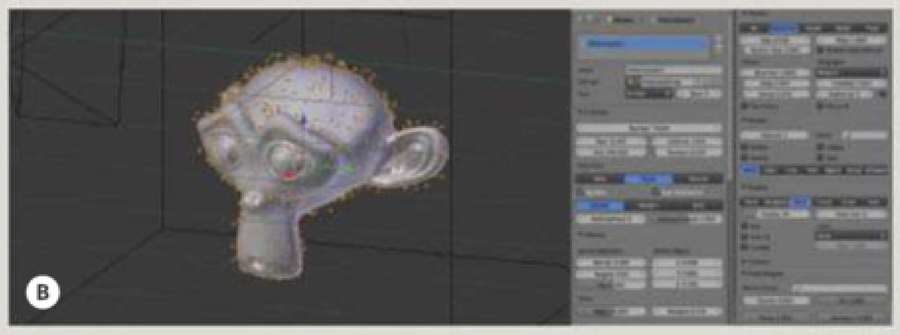
01 Set up the scene

The scene setup is very simple: add a cube (the domain), the Suzanne mesh inside the cube and also a light. Switch to View in Wire Mode (Z) to see inside the domain and put the meshes in place. Add the Subsurf modifier to Suzanne and set Smooth Shading. Apply a Force Field (Vortex) and set the Strength to 50. This way, the smoke will look more realistic A.

02 ParticleSystem

Select Suzanne, open the ParticleSystem panel (located after the Textures panel) and click +. I use 70,000 particles (Lifetime set on 4 frames), but they only give the smoke and flames the initial speed and direction. Their lives are short because we want the smoke to evolve freely. In the Render panel select None and in the Field Weights panel set the Gravity slide to 0 – otherwise the particles will fall down. It's better to lower the Particle Speed to 0.2, as high values could cause problems in the simulation B.



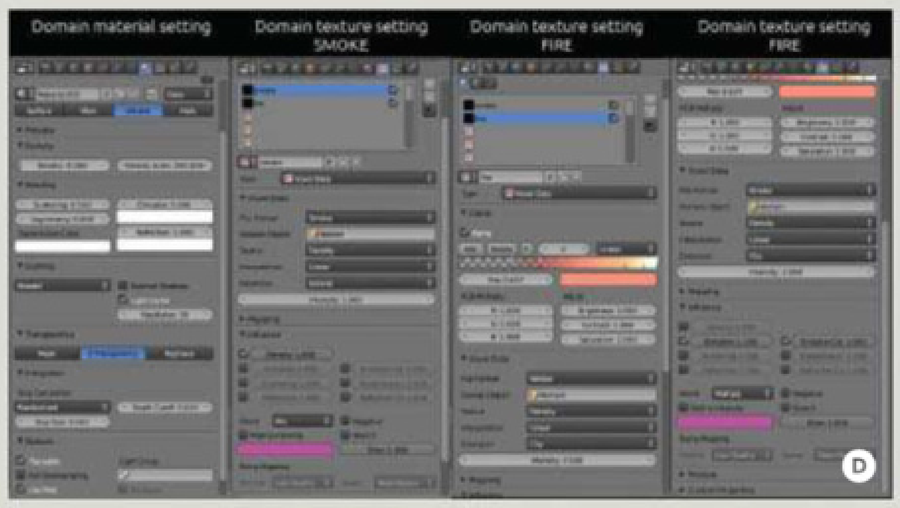


03 Establish the smoke

Select Suzanne, open the Physics panel, click Smoke and select Flow. In the ParticleSystem field select the name of the particle system created in step 2 and tick Initial Velocity. Select the domain, enable Smoke and choose the domain. I set Resolution to 180 (for a video or medium image, 80 is enough), Density to 1, Temp Diff to 0.1 (slow smoke rising) and Vorticity to 3. Set Border Collision to Open and Dissolves to 40. Enable Smoke Height Resolution, set FFT as the Noise Method and Resolution and Force Field to 2. Now save the Blend file and click Bake All Dynamics in the Smoke Cache panel C.

04 Volumetric material and texture

At the end of the simulation, select the domain and add a new material (Volume). Set Density to 0, Density Scales to 200, Scattering to 0.5 and Emission to 5. In the Integration tab, set the Step Size to 0.002 (reduce the noise in the flames). In the Texture panel add a new texture (Voxel Data) and rename it 'smoke'. In the Voxel Data Panel set File Format as Smoke, in the Domain Object field put the name of the domain, set Source as Density and tick Density in the Influence tab. Add another texture and call it 'flames', set Type as Voxel Data, select Color Ramp and create a gradient with the colours of the flames. In the Influence tab tick Emission and Emission Col, then select Multiply as the Blend type D.



05 Begin the render

Select a camera view that highlights the flames. I usually render 10 or 20 frames at a low resolution so I can choose the best frame. If the length of the flame is not realistic, try changing the Color Ramp texture. If the smoke is too dense, change the value of Scattering and Density. When the parameters are okay, increase the render resolution and press F12 E.

06 Final tweaks

Open Blender's Node Editor and add a glare node (Fog Glow) to give brightness to the flames, then insert another glare node (Streaks) and mix them. Apply an RGB curves node to slightly increase the contrast of the flame and finally a blur node (Fast Gaussian). Suzanne is now on fire! If you want only smoke, turn off the flames texture and set Emission to zero in the Material panel F.

Resolution troubles

Different resolution values can radically change the appearance of the smoke and flames. A higher resolution brings more detail, but it isn't always a good thing. If you want to create flames, a high resolution can create very small flames that are not so realistic, so it's better not to exaggerate this. If you want to create only the smoke, you won't have these troubles. Always keep in mind that any changes made in the ParticleSystem or on the domain parameters will force you to redo the simulation, which could take a very long time!

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Questions & answers

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3ds Max, V-Ray, Photoshop

Compositing tips

How do I convincingly add life to my arch-vis renders with photographic images of people?

When working with architectural visualisations, lifelike renders are no longer enough to make them successful. There is a little extra something that's needed to bring them to life, but finding this particular something is not always easy.

Today the market is oversaturated with companies that can produce CGI to fool the eyes, but I feel that this particular section of the industry is moving in another direction. Clients, as well as illustrators, are searching for emotions and ambiance in images rather than just realism. I'm going in this direction myself and have had my fair share of pursuing lifelike 3D renders. I find much more satisfaction in putting emphasis on 2D aspects and telling an image's story.

I believe the key word here is 'story'. Whenever I start an image I try to put together some kind of background to the scene that will make the image memorable – a sort of comic relief, if you will. It helps to put the place (interior or exterior) in context with the real world, giving it a history of its own. I love images that make me feel I'm only seeing a snapshot of something bigger, that the world of the image goes on beyond the borders of the render. I feel this is not the case with most work.

When elements are put together mechanically like a robot – evenly distributed 'clip art' people populating scenes, with no connection or interaction whatsoever – the results can be lacking some vital personality. I think the process of putting together a scene is more complex than this, so I make people interact with one another in the entire scene, not just in one corner. Also, try to keep it subtle, as another issue I often see is cool-looking clip art dominating the image so harshly that it steals the show in a cheap way. Fireworks on the left, a volcano erupting on the right, a robot in the middle... It's getting old.

You don't have to show something extraordinary or hilarious. Subtle events from everyday life can be the most effective things when done right.

01 3ds Max basics

I'll keep this part short because there is nothing special about an average 3ds Max scene that users can't figure out. Take a look at the wireframe with the lighting setup. A V-Ray light plane and light spheres are used to illuminate the scene.

The image is rendered using an Irradiance map and Light cache, both at medium settings. Shadow casting and receiving for the glass windows and the geometry of the lamps are all disabled to speed up the lengthy render time A.

02 Add in detail

The devil is always in the details, so it's especially important when you want your scene to be lively and believable that people are actually using the space. Move the furniture a little, pull out some chairs, rotate the tables a half degree here and there, and in general make sure they are not aligned 100 per cent to one another. Also try adding some slight noise to all reflections. Give as many imperfections to as many places as you can B.

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Overall fine-tuning

Once every element has been added with the same care and attention, all that's left is some fine-tuning. For this I always use Color Curves instead of Color Balance and pull the blues and reds up a little in the dark end, so the image has a little magenta in the blacks. This overall colour adjustment also helps to blend the elements together. Use the Burn Shadows tool around the edges of the image to give some more depth. Some Midtones- and Shadows-Dodging near the window will also help simulate the thickness of the air.

03 Get started in Photoshop

Some render passes are mandatory, usually: VrayExtraTex (Dirt map), Reflection, Refraction, Lighting, Z-Depth and WireColor (use a script to set all the wire colours according to the material). Out of these, the WireColor pass always seems to be the most useful. The Reflection pass in Screen mode for the glass, a little bit of Dirt map Overlay, some Z-Depth in Screen mode again and overall Levels adjustments for the basic render will get the piece ready C.

04 Get the right shot

When taking a photo to use as clip art, there are two things that are the most important: lighting and perspective. Try to re-create the lighting of your 3D scene in reality. In this scene we need natural light coming from the back/front and artificial light from the top. After taking the perfect shot, cut out your character, put him in a suitable place and mask out the unwanted areas D.

05 Blend the photo

Clean the cutout using the Eraser tool and soften the edges to make sure it fits in organically. Then comes some colour and light adjustments. Desaturate then make some Levels tweaks to match the white/black balance to the background. Add some more darkness to the character's back with the Burn tool and paint a dark shadow behind him. Flip the photo vertically to add his reflection onto the table and add some motion blur to it E.

06 How to handle a damaged photograph

Sometimes an image will need a little more work; for instance, the photo of the waiter is overexposed and flat, lacking the same richness of the scene. To fix this, I first do the same trick as before: tune the photo to the background as closely as possible. I then pull the white level down and use the Dodge Highlights tool with a soft brush to fake some of the lost information with a graphics tablet F.

Welcome to the Q&A section where we answer your technical quandaries in popular 3D programs, including Blender, 3ds Max, V-Ray, Photoshop and Sculptris

Sculptris

Sculpt for free

“How can I get started in digital sculpting without paying for expensive software?”

Few applications in the digital-sculpting world raise any hopes in artists looking to become experts any time soon. However, with its few buttons, functions and features, you'll soon know all there is to know about the technical sides of Sculptris. Here we explore the software's highly efficient workflow, which presents very few hoops to jump through. We'll address these here, while highlighting some ideas on how to approach a quick 3D sketch using the software.

Let's have a look at camera navigation first. Since Pixologic took on the patronage of Sculptris, ZBrush-style navigation has become the default. While in itself brilliant, the user interface is still unusual and uniquely suited for ZBrush. However, through the Options panel you can revert back to traditional Sculptris navigation, which makes most Windows users feel right at home again. However, in this case the Quick help will be slightly incorrect, since holding the Ctrl key then inverts the brush action. Holding down Opt/Alt and the left mouse button – or graphics tablet – rotates the camera around your model. Hitting Opt/Alt+Shift pans, Opt/Alt+Cmd/Ctrl zooms, but Shift remains the temporary Smoothing brush. Also, in the Options panel, you can activate Free Camera, which gives a more consistent trackball-like control of your view.

Although you can use a mouse, a graphics tablet is highly recommended. With Pen Pressure enabled you should set your brushes to full strength, as it's rare that you need to lower it. Don't forget to apply this to the Smoothing brush, as hitting Shift will activate this brush with its settings. In the Options panel you can also activate the Unify tool options, applying your present Size and Strength settings to all your tools.

The technical magic of the software is its adaptive geometry-generation. Sculptris automatically generates polygons beneath your brush tip, subdividing the geometry locally if needed. You can also control the amount via the Detail slider and toggle the Wireframe view to have a look at the actual geometry. At any time you can optimise the construction using Reduce Selected. This will try to melt redundant polygons away without destroying your details. With the Reduce Brush you can apply the same kind of reduction manually.

There's a lot more we could cover here, but hopefully you'll find enough to get started on your journey to becoming the Sculptrician we know you can be!

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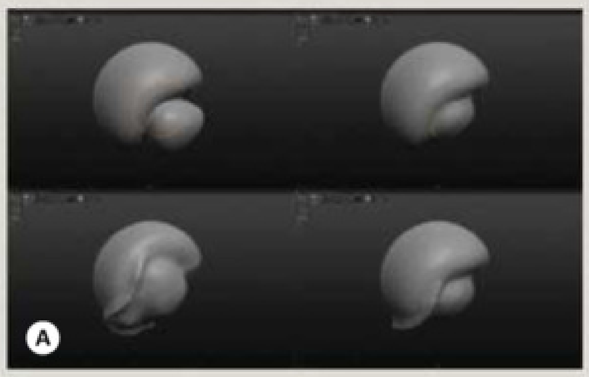

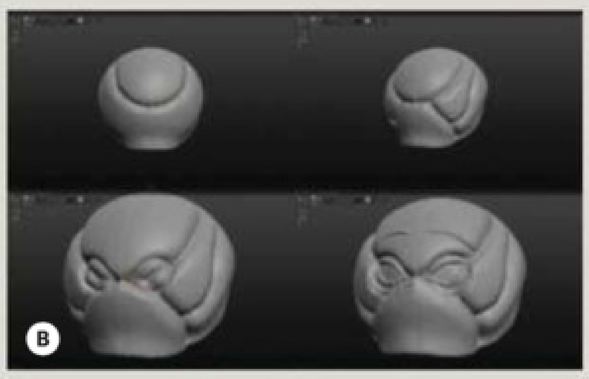

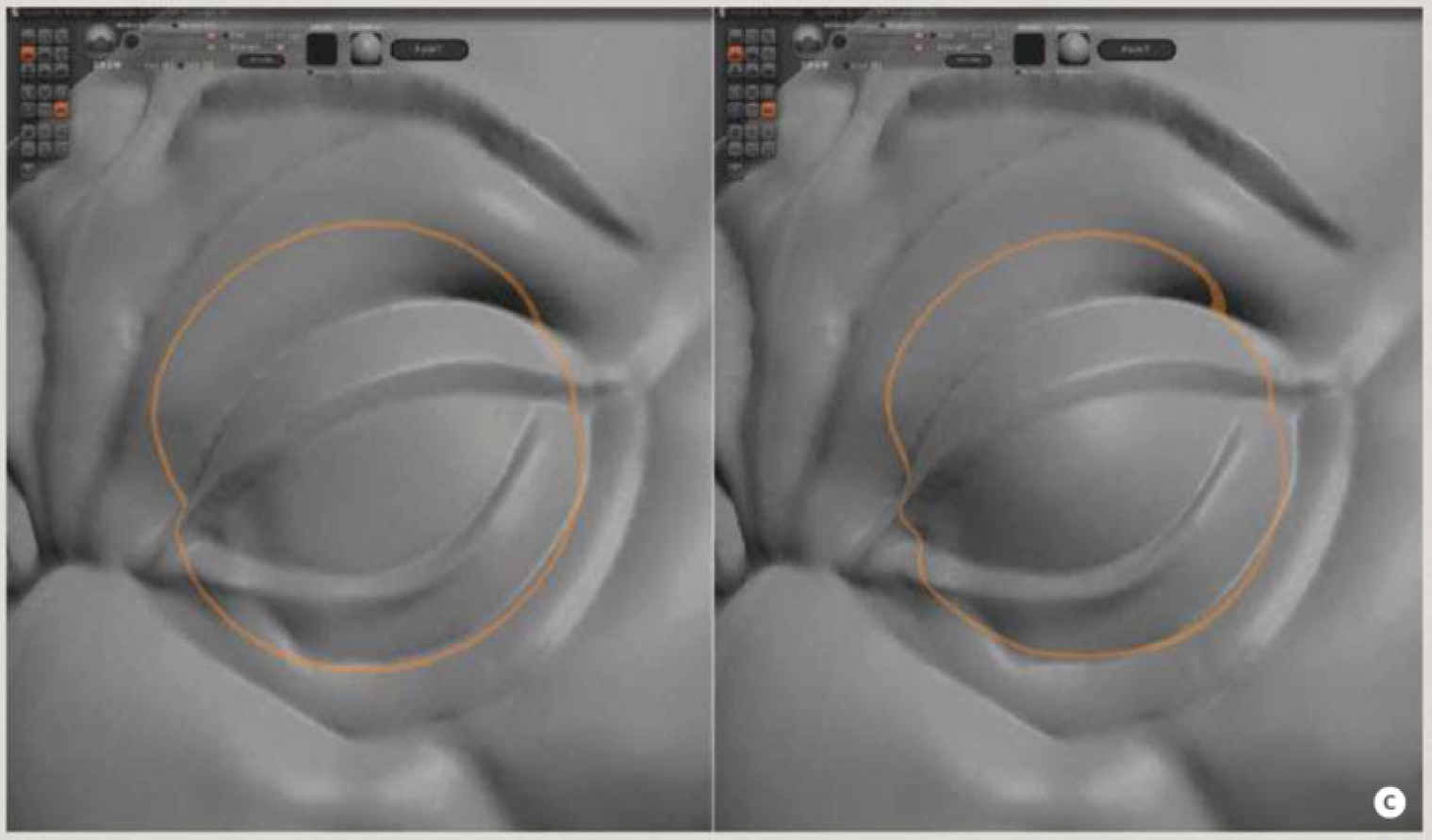

01 The Crease brush

My favourite brush is Crease (E), as together with Smoothing it's the most versatile sculpting tool. With a rather large brush size we can start our rough design. From the side we'll carve out a split between the skull and neck, then with Smoothing (Shift) we can melt down the neck area. With about half the brush size, hold Cmd/Ctrl to use Crease inverted and define a jaw line up to the chin A.

02 Apply to facial regions

Now we can outline facial areas such as the forehead, snout, cheekbones and eyes. Sculptris keeps the brush size relative to the screen – not to the zoom factor – so zooming in or out changes the brush size relative to the sculpture. We can use this to fluently work with one size on the coarser elements mentioned above, as well as finer details such as eyelids. For these we invert the brush initially, but then carve towards the inside of the eye B.

03 Use Airbrush mode

Here's a special trick for sculpting eyeballs. Pick the Draw brush (D) and toggle on the Airbrush mode (A). Normally Sculptris only begins to deform as you move your brush tip, but Airbrush mode activates a continuous deformation as you hold down your brush in place. This is great for extrusions like the neck and shoulders. With a gentle push centred inside the eye, slightly larger than the imagined eyeball, it creates perfectly round eyeballs C.

04 Continue carving

Turn Airbrush mode off, because it's no good if you complete brushstroke-based sculpting. Back on the Crease brush we continue carving out the rest of the facial features. Starting with a smile we'll crease the classic smile lines into the face. With Invert active we can outline the lips. With the Draw brush we'll give some volume to the lips carefully; start with the lower, then the upper lip, and then the creases around the mouth D.

05 Detail the neck & shoulders

Once more, we'll use Airbrush mode and the Draw brush. This time we'll make the neck and shoulders by rotating to the bottom and using a larger brush size. With a strong push we'll extrude the neck, then rotate to the side and push out the shoulders at the lower end of the neck. Switch Airbrush off and draw on some of the chest and muscles. You can use various brushes, as this is a great place to experiment E.

06 The Grab brush

As a last step we'll use my second-favourite feature: the Grab brush (G). Not only can you nudge things around with it, you can also pull entirely new features out of your virtual lump of clay. Let's pull out the ears and then work them with Crease and Draw until they're decently articulated F.

How to avoid trouble in paradise

Sculptris does its best to manage the geometry without you having much to do, but every now and then a mess can happen. If it does, check the wireframe and see if there's a dense cluster where there shouldn't be, then use the Reduce brush (Y) repeatedly over that spot until the polygons are dissolved. When doing this it's possible that Sculptris will crash, but an auto-save feature that's always active protects you from losing much, restoring the last state as you start the program again. Also, while Sculptris has an Undo, it doesn't have Redo function and symmetry is always a copy from the right-hand side.

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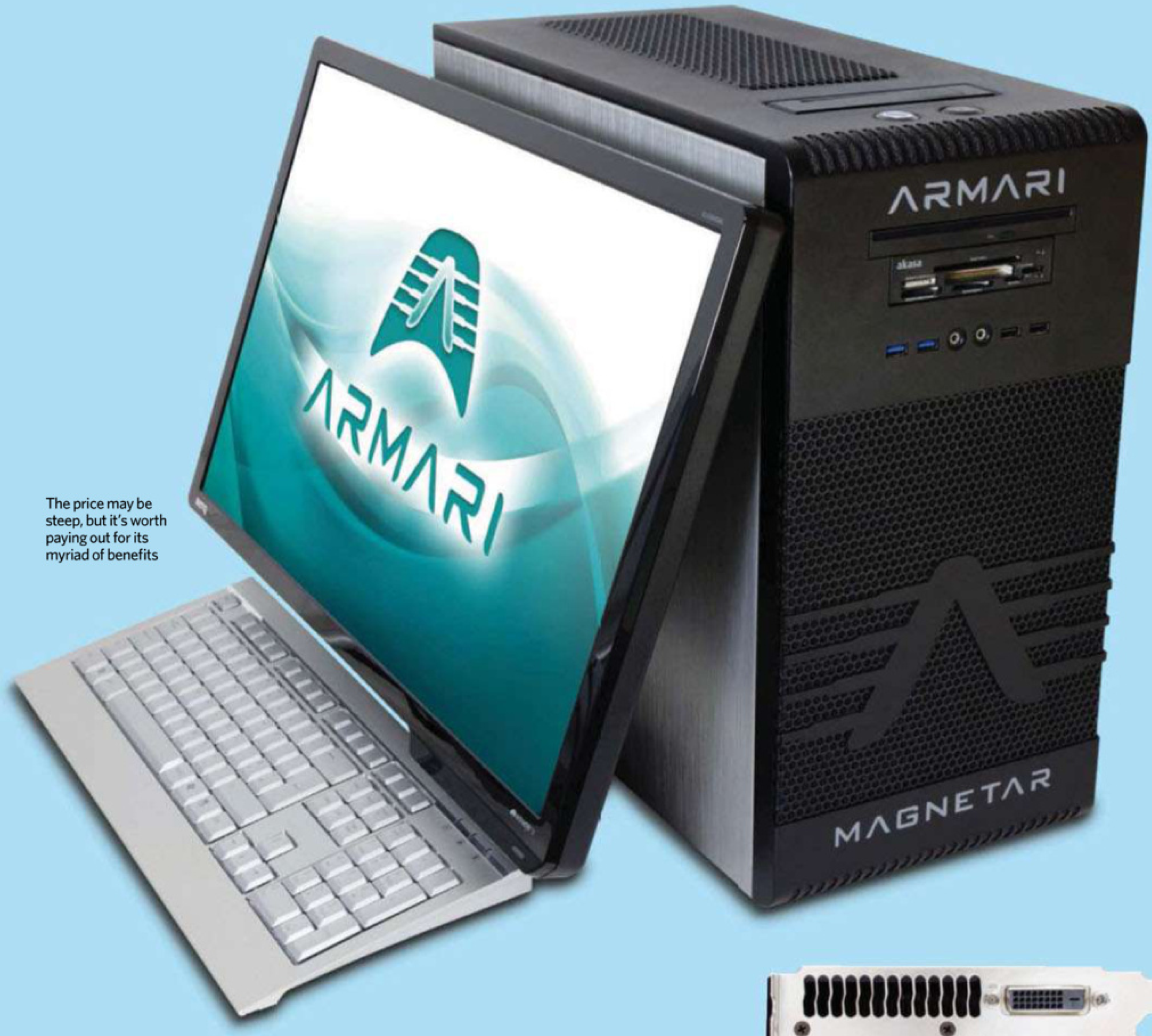
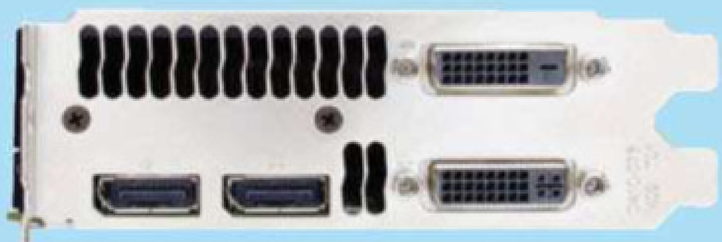


The price may be steep, but it's worth paying out for its myriad of benefits



As many as four monitors can be supported thanks to just one simple card

Armari Magnetar M32-AW750R

Armari's high-end Magnetar workstation is the first we've seen to use NVIDIA's new Kepler series Quadro K5000 graphics card

It's quite astonishing that Armari has managed to cram one of the most powerful workstations we've ever tested into a Micro ATX chassis, along with a liquid-cooling system and dual-redundant PSUs. But the Magnetar M32-AW750R is just that: a beast of a computer that batters 3D-rendering tasks with an arsenal of silicon, including two eight-core Intel Xeon E5 processors, 64GB of ECC DDR3 memory and NVIDIA's new Kepler GPU.

The PNY Quadro K5000 card is now the top-of-the-line NVIDIA graphics card, competing directly with AMD's W-Series FirePro cards. We'll discuss the next-generation Kepler architecture in more detail later on, but for an idea of the performance leap it offers over the previous generation, it has 1,536 shaders – more than three-times the amount in the Quadro 6000, NVIDIA's previous top-of-the-line GPU.

The Intel Xeon E5 2687W processors are no slouch either. Each has eight physical cores, which are split into two, for a total of 32 logical threads. They normally run at 3.1 GHz, but with Turbo 2 enabled can be

Inside this new Armari lurks one hell of a lot of processing power!

The K5000 revolution

The efficiency of NVIDIA's Kepler architecture heralds a revolution in workstation graphics cards

The Quadro K5000 is NVIDIA's first workstation-class graphics card based on the Kepler architecture. This family already includes the GeForce GTX 600-series gaming cards and Tesla K10 computer GPU. Kepler offers increased performance, enhanced efficiency and improved features over NVIDIA's previous cards based on the architecture, codenamed 'Fermi', which first showed up three years ago.

The Quadro K5000's specification is significantly improved over the older Quadro 5000 graphics card. The number of cores has increased from 352 to a staggering 1,536. 4GB of ECC GDDR5 graphics memory is now available, compared to 2.5GB before. NVIDIA states that the card is capable of 2,150 Gigaflops, which is about three times the raw number-crunching ability of the Quadro 5000.

When increasing performance, maintaining power efficiency is a big challenge facing computer hardware designers. This is especially critical for mobile devices, where power draw can have a detrimental effect on battery life, although in desktop workstations the graphics cards must still fit within a fairly tight thermal and power envelope. In the computer industry, the most important figure is now performance per watt, rather than raw GHz, or the number of processors or transistors.

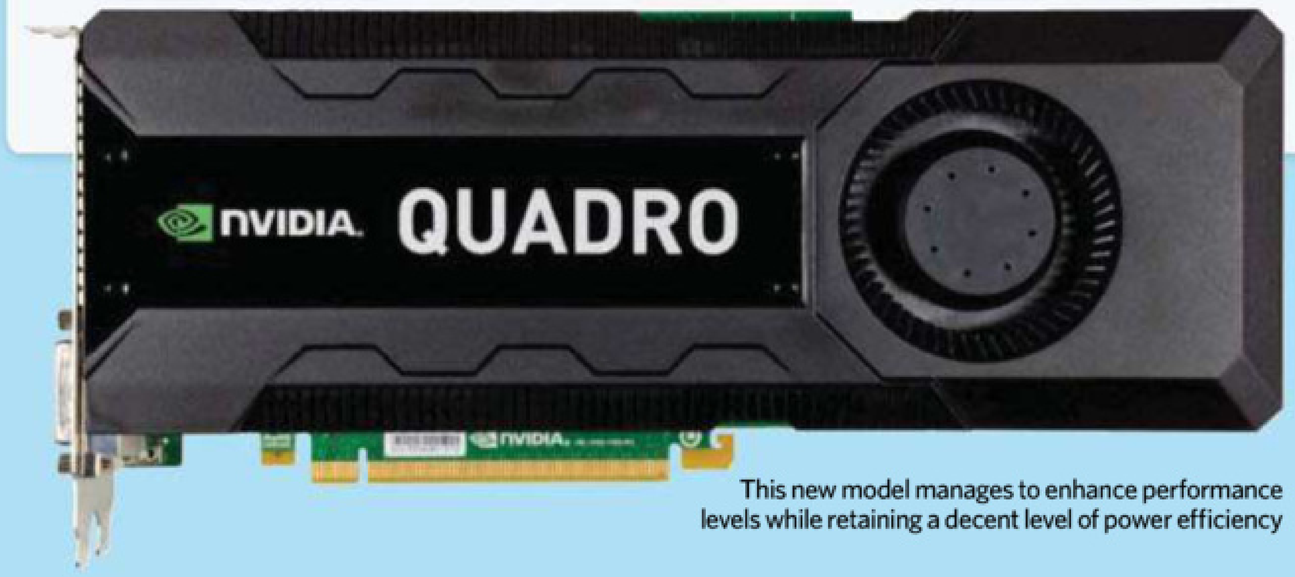
Despite the K5000's significant performance improvements over Fermi, NVIDIA has managed to reduce the card's power draw from the Quadro 5000's 152W to 122W – in part due to a process shrink, from 40nm transistors to 28nm, but also thanks to its architecture enhancements under the hood.

Fermi's 320-bit-wide memory bus has been reduced to 256-bit with Kepler, and the cores now operate at the same frequency as the memory. While the K5000's memory bandwidth has only seen a modest improvement over the Quadro 5000 to 172Gbit/sec, the reduced thermal overhead allows for improvements in other areas with a greater overall effect on performance.

The K5000 uses processors grouped into SMX functional units, each containing 192 cores, which use simpler control logic than the SM cores in Fermi. Kepler cards enable Dynamic Parallelism, which improves the efficiency of communication between a CPU and cores on the GPU. Applications that are designed to rely on messages passed between the CPU and GPU should see a big improvement.

Kepler also supports TXAA anti-aliasing, a film-industry technique that arguably produces smoother images than FSAA, which can be processed at 64x with a single K5000 card, or 128x with two cards in a workstation. Kepler also supports up to four monitors from a single card, and can power desktops in 4K resolution (4,096 x 2,160 pixels).

While these added features, along with support for DirectX 11.1 and OpenGL 4.2, mark a natural evolution for NVIDIA workstation graphics cards, the K5000's reduced TDP and performance represent nothing short of a revolution in GPU design.



This new model manages to enhance performance levels while retaining a decent level of power efficiency

boosted to 3.8GHz. Turbo is an Intel technology that boosts the clock speed of one core while others are idle, but with the Magnetar's cooling hardware it works slightly differently.

Armari uses a custom DMX liquid-cooling system for the Xeons, which comes with two radiators – each capable of dissipating 250W of heat. Processors usually operate in Turbo mode in short bursts, otherwise the processor becomes too hot. This is less useful for rendering tasks that last days, but the overhead provided by this cooling setup enables the Xeons to run in Turbo mode constantly. This means the Magnetar always offers high performance, whether running single- or multi-threaded software.

We expected the Magnetar would deliver record-breaking performance and that's just what we saw. It's unlikely the score of 25.44 in CINEBENCH will be beaten for a while: the Magnetar's 3ds Max render times were 30-per-cent faster than our previous best. The SpecViewPerf scores were incredible, with 118 points in Maya – double that of a Quadro 4000 workstation.

The Magnetar M32 is beyond the budget of many creative artists, but the price tag is slightly easier to swallow if you consider the cost of software licenses. We suspect those with the most to gain from the Magnetar M32's multi-processor, high-end hardware will be keen to queue up to buy this over a slightly cheaper workstation.

The good & the bad

- ✓ Exemplary compute and graphics performance
- ✓ Portable MicroATX chassis
- ✓ Cooling system enables constant Turbo 2 mode
- ✓ Additional power supply provides redundancy
- ✗ Prohibitive cost for non-professionals

Essential info

Price: £5,990 (ex VAT)

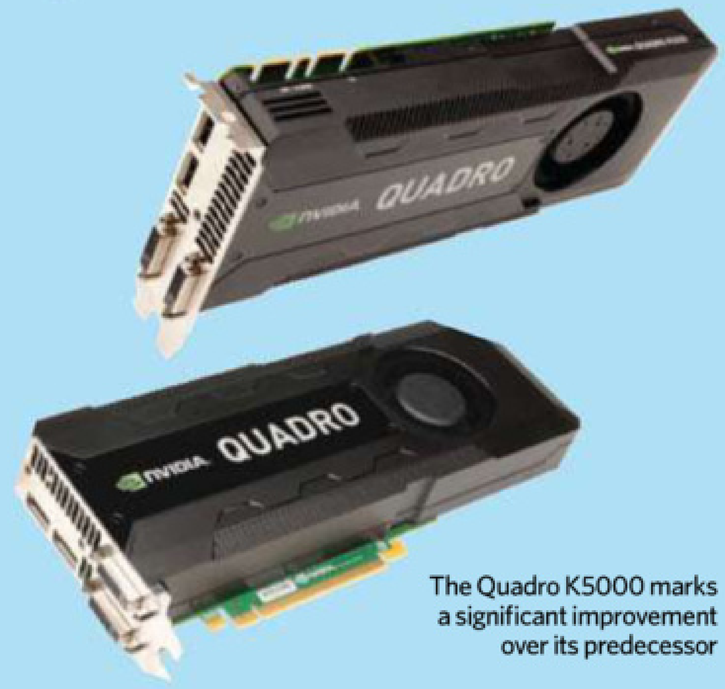
www.armari.co.uk

OPERATING SYSTEMS

- Windows 7 Professional 64-bit

OPTIMAL SYSTEM REQUIREMENTS

- Dual Intel Xeon E5 2687W (3.1GHz)
- 64GB ECC-Registered DDR3 memory
- NVIDIA K5000 Graphics Card
- 240GB Corsair Neutron SSD
- Dual 750W PSU
- Dual-radiator liquid-cooling system
- Armari Magnetar M32-S4HS Pro Workstation chassis



The Quadro K5000 marks a significant improvement over its predecessor

Our verdict

Features	10/10
Ease of use	9/10
Build quality	9/10
Value	6/10

"The Magnetar M32 is one of the most capable under-the-desk workstations we've seen yet"

Final Score 9/10

HDR Light Studio 4

This powerful solution for creating custom HDR environment maps gets put through its paces

Setting up an interesting colour scheme for this render took a matter of minutes. The output being image-based lighting also means very fast renders

The interface in action with the LiveLight window on the right where you can interactively paint the location of highlights using the LivePaint tools

The software enables you to explore variations freely, which leaves plenty of room for experimentation

HDR Light Studio is a program aiming to make life easier for anyone who requires high-quality, studio-style lighting. It offers a very efficient workflow that makes the task of creating complex lighting setups extremely quick and easy.

The software has been around for a few years, but in the past was confined to a high-end niche due to its relatively high price. Now in its fourth iteration, the price has come down substantially and this has created new interest in the application.

We've tested HDR Light Studio 4 with both modo and Maxwell – two packages widely used for product visualisation – and this provided us with a good overview of the two workflows available.

In modo, where there is currently not a live connection to HDR Light Studio, the scene must be exported and previewed in the standalone version of LiveLight, which offers an OpenGL view. Here the lighting can be previewed, but not at final-render quality; exporting back to modo and updating Preview takes a few seconds. This means the feedback is far from instant and the workflow, although good, is a little uneven.

When working in Maxwell Studio, it's a very different story. Here there is a live plug-in, which means any changes to the lighting are reflected instantly in the FIRE preview render, giving instant updates of the final lighting. This is probably the very best lighting workflow we have ever experienced; it takes all the guesswork out and means you can experiment freely without any delays.

HDR Light Studio offers a variety of lights, ranging from synthetic to photographic captures of studio lighting and is also designed to work in addition to existing imagery. This enables the user to both dim or add to light sources in captured HDR images. As well as an outstanding Color-Picker tool, there are some great workflow features, including the ability to paint reflections directly onto the model. You can also use the LivePaint tools to control illumination and backlighting.

For specialists who make their money creating product shots, HDR Light Studio 4 is almost certainly an essential addition to their toolkit. However, for the average 3D user there may be some hesitation about spending serious money on such a niche package. In the end it really does depend on the kind of work you aim to do and how often you rely on studio lighting in your renders. If you value workflow we recommend looking into the purchase – the package is a joy to use!

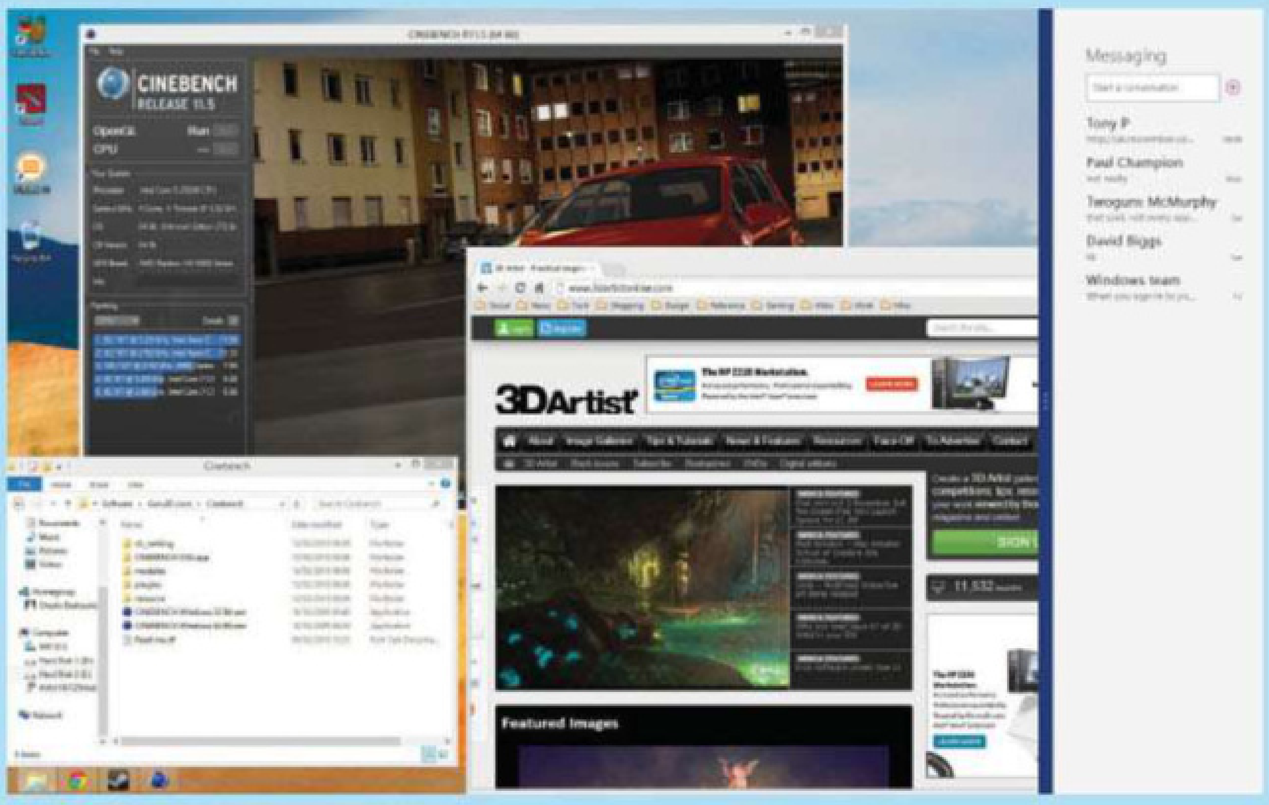
Our verdict

Price: £299 / $499
www.hdrlightstudio.com

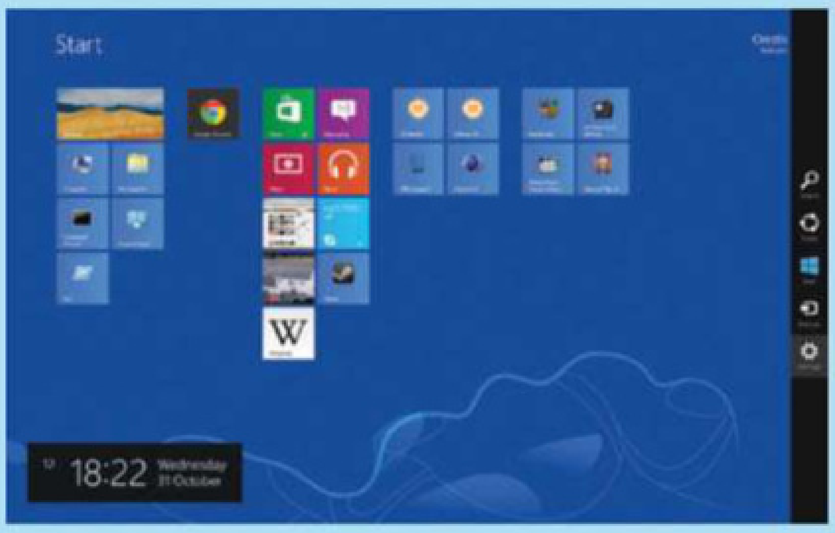
Features	8/10
Ease of use	9/10
Reliability	10/10
Value	6/10

> "While expensive for such a niche product, HDR Light Studio 4 offers a fantastic workflow"

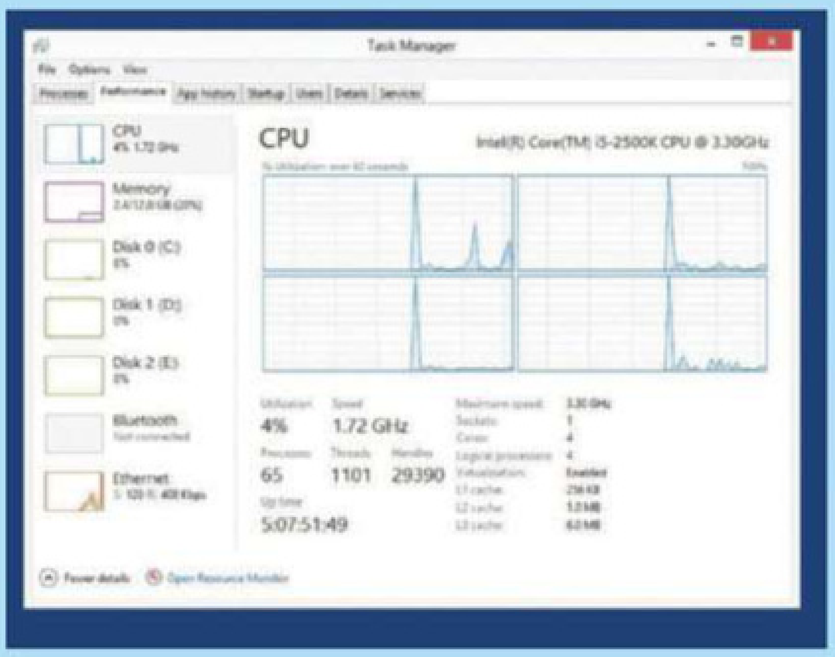
Final Score 8/10



Some Modern UI apps, such as Chat, can be docked to the side of the desktop, which has been given a lick of paint



The Start screen works better if you rearrange its layout. We replaced many of the bundled programs with shortcuts to Windows functions



The Windows 8 Task Manager now shows a more detailed breakdown of the available resources in a system

Windows 8

Windows 8 brings a touch-friendly interface and a new visual style to workstations, desktop and laptop PCs

Windows 8 is Microsoft's attempt to unify tablets and traditional computers with one operating system. Its touch-friendly, tile-based overlay called 'Modern UI' (which *was* known as Metro) replaces the familiar Start menu with a screen of tiles for launching applications.

Modern UI is both an application launcher and a full-screen software environment, including new apps for email, web browsing and so on. It also features a store that offers third-party software. Underneath is a Windows desktop that functions as before, albeit with enhancements. Combining such different interfaces is a bold undertaking, but Microsoft just about pulls it off.

While Windows 8 works on mobile and desktop Intel-based computers, a variant known as Windows RT has been created for hardware with power-frugal ARM processors, such as Microsoft's own Surface tablet. Confusingly, although they both look identical and run Modern UI applications, desktop software such as Photoshop is not compatible with Windows RT, unless Adobe creates a version for Surface.

Modellers will be more interested in how Windows 8 runs on a standard PC or workstation than a touch-sensitive portable device. In this respect, Windows 8 is more powerful and useful than ever. Boot times are noticeably faster than Windows 7 as well. From comparative benchmarking between the two operating systems in both CINEBENCH and SPECviewperf, we noticed a performance gain in some tests. Our CINEBENCH OpenGL score improved from 66.9 to 71.1, while LightWave went up by four per cent and Maya two per cent.

The File History works like Apple's Time Machine, enabling you to revert to snapshots of files organised by date. Dual monitors work better in Windows 8 too, with a new management screen and taskbar that stretches across the displays.

DirectX 11.1 is exclusive to Windows 8 and Windows RT, and is a fairly minor update to the API. Its main feature is native support for stereoscopic 3D, along with new tools for Direct3D programmers, such as shader profiling and compiler enhancements.

The desktop has a bold visual style, and the File Explorer has a new set of icons for common tasks. Other additions, such as Storage Spaces and Microsoft's Skydrive integration, are minor but welcome.

So should you upgrade? It depends. Some of the changes are cosmetic, and the split between two different user interfaces may put some off. However, Windows 8 is stable, performs well and Modern UI never gets in the way if you only use desktop software.

The decider is the asking price, since both the retail and upgrade editions cost less than any previous version of Windows. This may make it worth a punt – especially if you're upgrading from XP or Vista.

Our verdict

Price: From £49/$79 US
www.windows.microsoft.com

Quality	**8**/10
Variety	**8**/10
Overall usefulness	**8**/10
Value	**9**/10

"Once you're familiar with Windows 8's new interface, the overall quality of the product becomes a lot clearer"

Final Score 8/10

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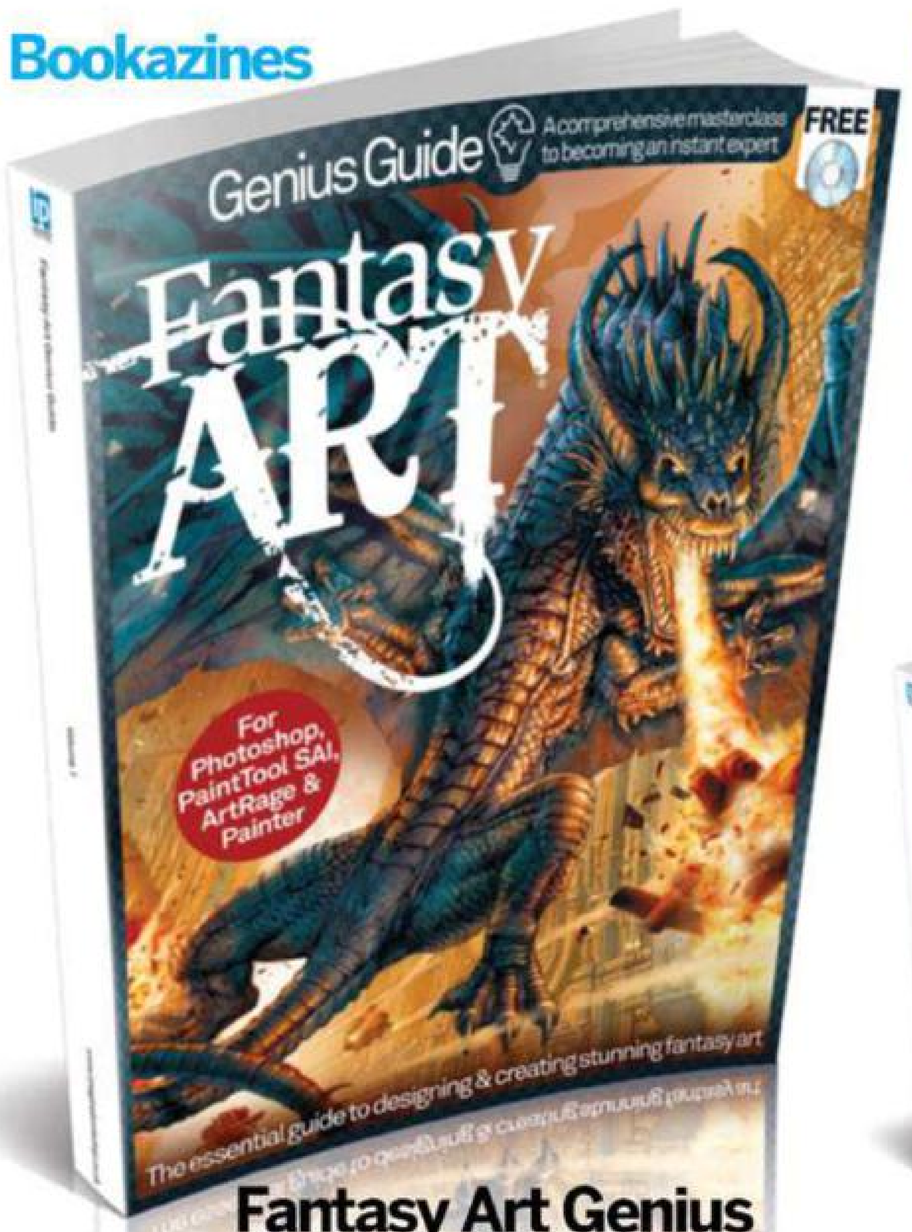
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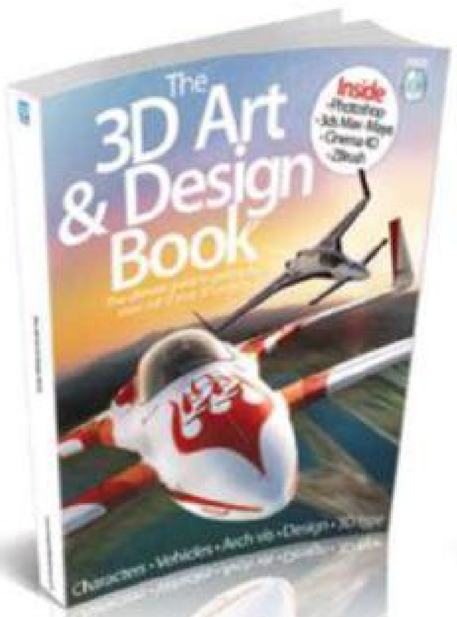

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MAXON and AMD join forces

The AMD FirePro W-Series graphics cards aim to make life easier for CINEMA 4D users

Technology company AMD and CINEMA 4D creators MAXON have entered into a partnership to provide 3D designers with an unbeaten experience when it comes to performance. The AMD FirePro W-Series graphics cards now offer drivers certified by MAXON, which have been specifically tuned to provide new levels of performance and reliability for use of the CINEMA 4D R14 toolset.

This advance in technology has been designed to keep 3D artists productive when working on the most complex scenes, reducing crashes and increasing processing power across the board. For example, the powerful new sculpting toolset in CINEMA 4D R14 enables flexible options for quickly designing incredibly detailed 3D models. Having adequate GPU processing is crucial when ensuring fluid and effortless user interactivity as geometric detail increases. With the advanced technology and performance provided by such MAXON-certified cards as the AMD FirePro W5000, W7000 and W8000, the partnership aims to ensure that 3D artists working under tight deadlines can still keep up with even the most demanding of projects and deliver a higher quality final product.

Put to the test

MAXON's CINEBENCH software offers a benchmark in testing graphics card performance by incorporating a user's common tasks in CINEMA 4D, measuring its performance in real-world situations. These scores were taken when AMD and NVIDIA went head-to-head:

AMD FirePro V3900	67.07
AMD FirePro V4900	89.70
AMD FirePro W5000	158.86
AMD FirePro W7000	181.04
AMD FirePro W8000	177.26
AMD FirePro W9000	179.95
NVIDIA Q410	37.07
NVIDIA Q600	41.62
NVIDIA Q2000	76.19
NVIDIA Q4000	91.01
NVIDIA K5000	132.86
NVIDIA Q6000	140.35

"Opinion"

Healthy competition

Small game, big ambition

AMD's Rob Jamieson explains why the company is backing MAXON

Rob Jamieson www.amd.com

"MAXON's certification of AMD's FirePro graphics cards is great news – not just for us at AMD, but more importantly for CINEMA 4D users.

"By using the FirePro cards you can work in the knowledge that you're getting an unbeaten 3D design experience from the software. The cards have been specifically tuned by AMD to provide new levels of performance and reliability. They also support all of the enhanced OpenGL lighting modes, as well as enable artists to call on all of the graphics card's resources when loading larger, complex scenes. The cards are designed to keep up with demanding projects and help artists deliver a higher quality final product, even when working to tight deadlines.

"CINEMA 4D is a strong contender in the marketplace and the numbers we've seen put it in second place behind Autodesk M/E applications as the most used purchased 3D content creation tool. Recent figures show that MAXON is increasing its share year on year, which is a testament to the solid functionality that CINEMA 4D offers. The increased competition in this sector is great news for users, giving them more choice and encouraging further innovation."

One of the other exciting developments is OpenCL, enabling DCC, CAD and simulation software to tap into the processing power of modern GPUs

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HIERO 1.5 now available

The Foundry introduces more helpful new features

HIERO, The Foundry's shot-management, conform and review tool, has been updated to version 1.5. The new package comes with four major upgrades, the first being Windows OS Support, which means HIERO can now run on the three major platforms of Windows, OSX and Linux. HIERO 1.5 now also offers Broadcast Monitor Out functionality for use with broadcast monitors; multi-channel image support so users can view all the image layers of multi-channel EXRs for CG passes; and support for playback of native ARRIRAW camera footage.

"It's been a busy year of development since we launched 1.0 back in March this year, and we're really excited to bring the new features of HIERO 1.5 to our customers as well as the all-important Windows support," said Ant Nasca, HIERO product manager at The Foundry. "HIERO's viewer and media-handling abilities have really evolved since 1.0... which is going to enhance the review process for users."

HIERO 1.5 is available for $3,750 US (£2,328). Visit www.thefoundry.co.uk.

You can download a free 15-day trial of HIERO 1.5 simply by heading over to The Foundry website at www.thefoundry.co.uk/products/hiero

OpenVDB accessible

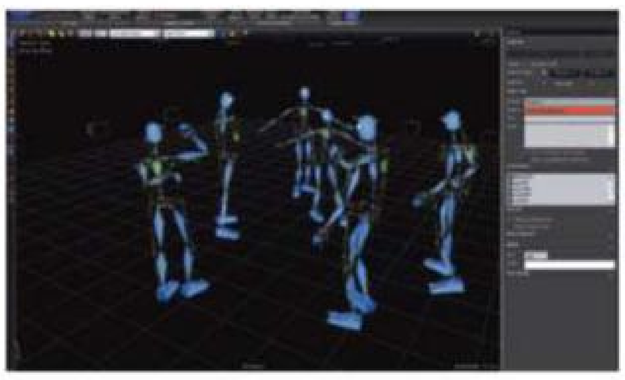
DreamWorks makes OpenVDB open source

DreamWorks has released its previously proprietary volume-data format OpenVDB to the public. The library enables a dramatic increase in the scale of volumetric effects such as smoke and other amorphous materials. DreamWorks previously used OpenVDB for projects *Puss in Boots*, *Madagascar 3: Europe's Most Wanted* and more recently in *Rise Of The Guardians*. The studio's hope is that by making OpenVDB free, it will eventually become an industry standard "that ends up benefitting us", DreamWorks' David Prescott told the *Wall Street Journal*. Download OpenVDB from www.openvdb.org.

"With OpenVDB, we are able to overcome the memory limitations to which other data formats are subject," said DreamWorks' David Lipton

Blade 2 released

New mocap software delivers real-time results out of the box



Blade 2's real-time is like nothing I have ever seen before," said Audiomotion's Mike Hedges. "It's robust and solid even on the most testing of shoots"

Following a successful alpha program, Vicon has announced the official release of its mocap processing software, Blade 2. Following two years of extensive development, Blade has been re-engineered with the new live engine, Axiom, meaning the software is capable of effortlessly managing the capture of multiple characters, complex production scenarios and difficult conditions. New features include the real-time processing of digital character animation, automatic fixing of occlusions and faster workflows. Visit www.vicon.com.

Software shorts

Bringing you the lowdown on product updates and launches

Unity 4.0

Unity Technologies is now shipping Unity 4, the latest update to its market-leading game engine. The core feature for this release is Mecanim, a tool that enables users to retarget animation clips and create blend trees and state machines for characters. Other new additions include support for DirectX 11 and the ability to publish to Flash or Linux. The base edition is free, while the Pro edition costs $1,500 US. Learn more at www.unity3d.com.

RayFire 1.60

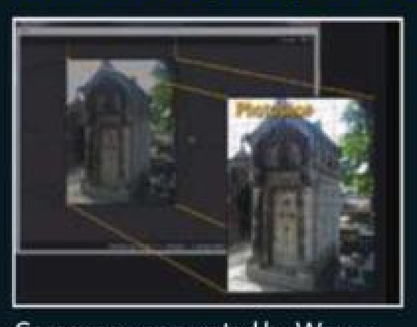
Mir Vadim has updated the RayFire destruction plug-in for 3ds Max, offering an incredible new feature: the ability to use a texture map to control how an object breaks. The system supports both photographic and procedural textures, and offers a range of control options. You can even get great results by simply placing a stock image on a model and shattering it. You can purchase a full commercial licence for $325 US or download a trial version over at www.rayfirestudios.com.

Octane Render

Otoy has announced that Octane Render 1.0 is available for 3ds Max, Maya and Poser, and will soon be available for Softimage, AutoCAD, DAZ Studio, LightWave and CINEMA 4D. The upgrade features improvements to speed, flexibility and lighting. Octane Render standalone costs €199; for other options visit www.render.otoy.com.

Epic's new free tool

Carapace enables users to generate simple but useful perspective grids



Carapace was created by Warren Marshall as part of Epic Games' monthly Epic Friday sessions, where employees are encouraged to work on pet projects

Epic Games has released Carapace, a free tool that enables users to generate one-, two- and three-point perspective grids. The grids can support up to nine vanishing points, and can be pasted into Photoshop for use as guides. The tool can also be used to create grids for existing reference images by drawing trace lines on the screen. Carapace is available now for Windows only. You'll need the .NET 4.0 framework installed to use it. You can read more about the tool and access the download via www.epicgames.com.

Stonehenge

● **DID YOU KNOW?** • AAA Studio is working on a 3ds Max version of its GPU-based render engine FurryBall

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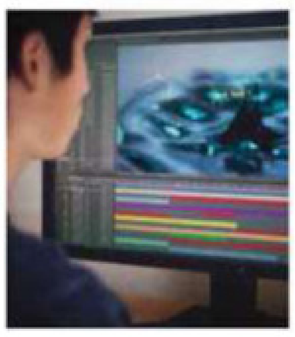
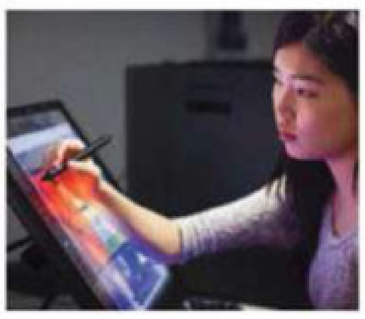
The tutor



The Savannah College of Art and Design
SCAD is a private, non-profit, accredited institution conferring bachelors and masters degrees to prepare talented students for professional careers. The university offers more than 40 majors and nearly 60 minors in Savannah and Atlanta in Georgia, Hong Kong, Lacoste in France and online through SCAD eLearning. SCAD's 11,000 students are nurtured by a faculty of 700 professors, each with esteemed academic credentials and valuable professional experience.



Motion media designers deliver some of the most memorable and captivating moments in digital media: the title sequence, the opening visual of a network sports broadcast and the features that turn computers and smartphones into moving, living canvases.

At SCAD, students on the Motion Media Design program study every facet of this discipline. The undergraduate curriculum includes courses that cover everything from form in 3D space to 20th Century art.

The academic environment, meanwhile, is professionally focused, offering plenty of opportunities for students to work on cutting-edge industry projects.

Everything students learn feeds into a professional-grade portfolio, which can be used to get actively recruited by the likes of Apple, CNN, ESPN, Sony and ILM. "Every motion graphics owner I speak [to] tells me how many SCAD alumni they have as employees," says SCAD School of Digital Media dean Tina O'Haily. "You can't even search the topic without finding a SCAD alumni."

Even the students agree. "I can say with confidence that the Motion Media Design graduate program at SCAD stands out above many others," says MA Motion Media Design candidate Rosana Velez. "Research into graduate programs led me to what I was looking for: a well-balanced conceptual Master's program, complete with training from some of the most inspiring professors.

"The motion media design program at SCAD is fulfilling my dreams by refining my career... skills and confidence as a motion designer."

> "Our Motion Media Design program focuses on design, typography and fine art rolled into one amazing degree"
>
> **Tina O'Haily,** dean of SCAD School of Digital Media

Images courtesy of SCAD

A *Pan-Am Title*
» Preston Gibson
Gibson, who completed his MFA at SCAD in 2012, won himself an American Advertising Federation 2012 National ADDY Award for this piece

B *Air*
» Grant Hoki
SCAD is the only US university to offer BFA, MA and MFA degrees in motion media design, letting students earn specialised and terminal degrees

C *The Reborn*
» Rick Kuan
Potential careers in motion media design are wide and varied, including corporate design, motion graphics, new media, post-production and much more

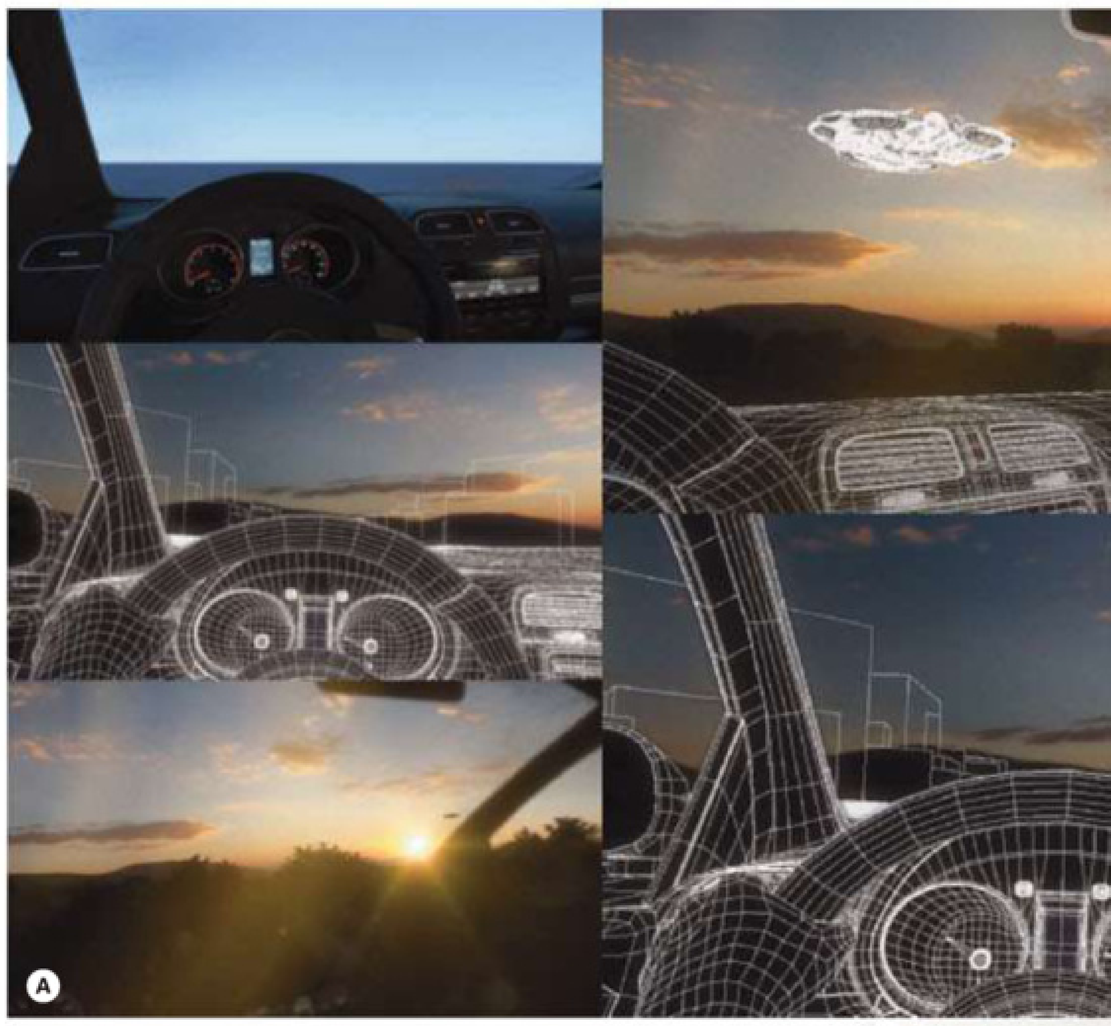
D *Legendary Astronaut*
» Rick Kuan
SCAD often hosts symposia, such as Inspire and CoMotion, where students can meet and exchange ideas in motion design and media art

E *Dream Machines*
» Various
In 2012, motion media projections turned the SCAD Atlanta Events Space 4D with an immersive light show experience for the Dream Machines installation

Project Focus

'UFO Over Santa Clarita'

Turns out those UFOs could be faker than we realise!



Project 'UFO Over Santa Clarita'

Description 'UFO Over Santa Clarita' takes the form of a shaky-cam viral video of a UFO sighting in which a road traveller leaps from his car to catch a glimpse of an alien mothership soaring overhead. The gag, however, is that it's not just the UFO that's CGI, but the entire video.

Software Maya, Mudbox, After Effects, Photoshop, Premiere

Company Gnomon Studios

Bio Gnomon Studios is the original content-creation wing of the Gnomon School of Visual Effects, where resident director Aristomenis Tsirbas develops, directs and runs a wide variety of projects. Select Gnomon students have the unique opportunity to intern at Gnomon Studios and gain invaluable professional experience before entering the job market.

Location Hollywood, USA

Website www.gnomonschool.com

The first time you lock eyes on Gnomon Studios' 'UFO Over Santa Clarita' project, you may not feel hugely impressed. Yes, the two alien starships that manifest in front of a hazy late afternoon sunset certainly look good, and the *Cloverfield*-esque found-footage setup lends the piece a sense of excitement, but this isn't anything we haven't seen before, surely?

You may find yourself convinced otherwise when you discover that not only are the extraterrestrial vessels CG, but the entire project is – from the skyline bathed in shadow to the dashboard of the car itself. You may have missed it on your first watch, but this is a production more exciting for its photorealism than its creation of otherworldly alien craft.

"The idea behind this project was to create a 100-per-cent CGI shot that comes off as real," says director Aristomenis Tsirbas. "The intended gag was for the audience to assume that the spaceships had to be visual effects, yet not realising that everything is visual effects – the ground, sky, car – everything."

The results are indeed impressive; the distraction of the spaceships is enough to divert your attention from the fact that their surrounding environments are no more real.

"Maya was the core 3D package used, along with Mudbox and Photoshop for texturing, After Effects and NUKE for compositing, and Premiere for editing," says Tsirbas. "Maya's instancing system was crucial to enable tens of millions of polygons worth of trees, shrubs and grass renders without hitting RAM limits."

The first step of the project was capturing useful references to build the environment's digital panorama from. "Once we had that, I modelled and animated an advanced animatic indicating where block-ins of all the objects were to be animated," explains Tsirbas. "My camera animation and lighting was final so the crew knew exactly what assets needed to be created and to what level of quality.

"The concept artists came in while the environment team went to work, creating a high-res road, vegetation and scenic elements. The CG car was also created at this time, built from scratch using a VW GTI as reference. Over the course of a couple of months, the part-time students at Gnomon Studios refined all the assets until the project as a whole was ready to render. Rendering took a few days, distributed over a dozen computers."

For Tsirbas, it's watching the experience through what is ostensibly the lens of a handheld camera that sells the perceived reality of the short. "It's absolutely crucial that the camera motions feel believable," he tells us. "This requires spending a lot of time adding just the right amount of resolution to the roughness of the motion. It's also important to be aware that real shots often

The director

Aristomenis Tsirbas

> "The intended gag was for the audience to assume that the spaceships were visual effects, yet not realising that everything was visual effects"

A Although you can see very little of it in the finished piece, the car model is actually fully detailed. It is only hidden in shadow in order to make the lighting and lens exposure feel more real

B The interesting aspect of this feature may be the fact that everything on screen is VFX, but the mothership is nevertheless a particularly impressively modelled piece of CG artistry

workspace

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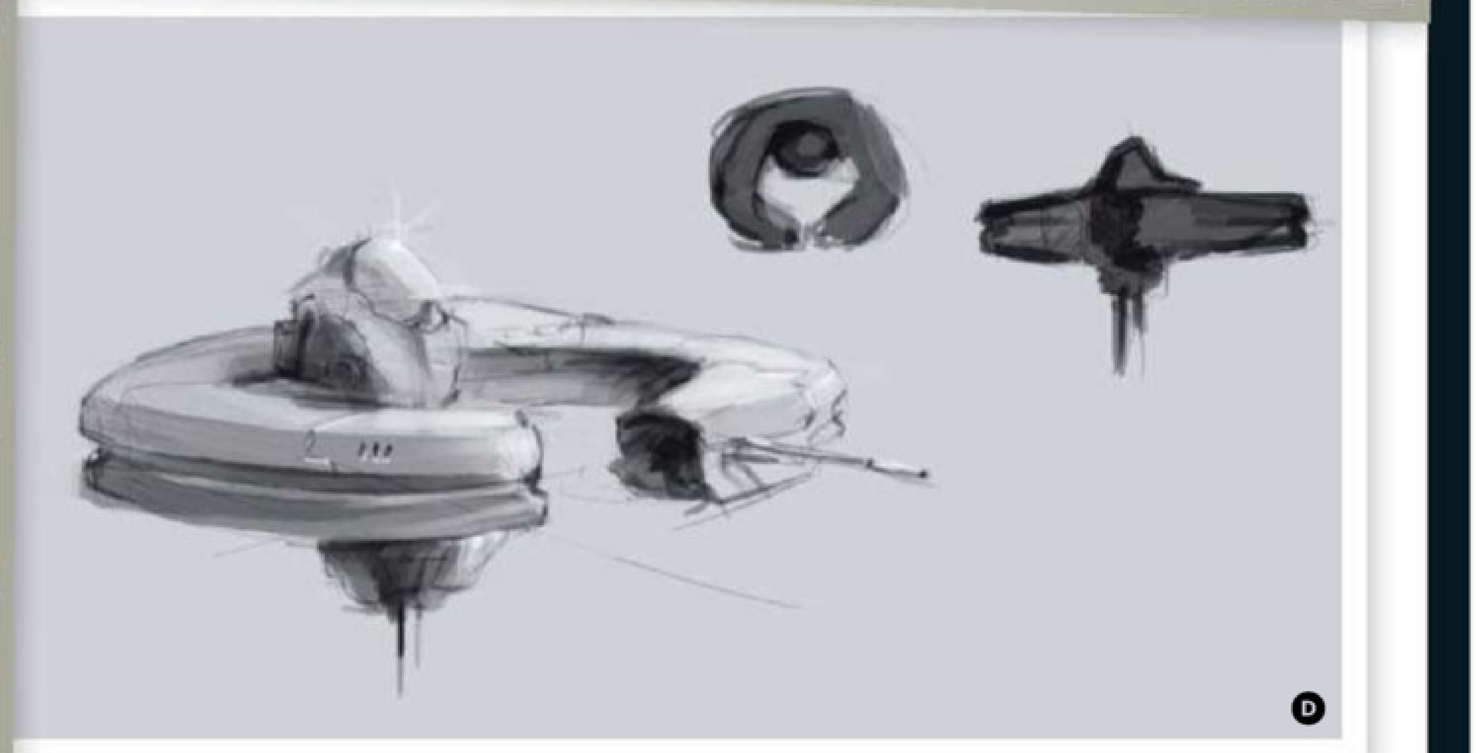
B

C



D

E

have parts that are dark or blown out. That's why our car interior is underexposed – which unfortunately meant hiding much of the beautiful modelling work."

As a concluding point, Tsirbas makes it clear that in order to achieve true-to-life reality, you have to be prepared to get a little bit dirty.

"Reality is often messy and unpolished. Building imperfections into the models, textures, animation and post effects – such as lens aberrations like flares and smudges, which were added to help enhance the handheld, amateur movie feel – all help to sell CGI as appearing real instead of digital."

C These images illustrate how good reference material can come from anywhere – in this case, basing an organic-looking ship design on a mirrored and dissected chicken carcass!

D Even with a short 30-second project like this one, you will only achieve notably impressive results if you dedicate a large portion of your schedule to the process of pre-production

E Tsirbas' core advice when aiming for realism is to keep things messy. Real life isn't completely clean and polished, of course, so you need to incorporate that facet into your work

Studio Access

Fresh designs

Pikcells reveals its latest high-profile collaboration with Kronospan, Fresh 3, and discusses architectural trends

PIKCELLS VISUALISATION STUDIO

Formed in 2003, this multifaceted design studio in the heart of Huddersfield specialises in animation, CG imagery and interactive projects in support of the architectural, property development, retail, design and manufacturing industries. The studio currently consists of a full-time team of thirteen.
Country UK

www.pikcells.com

Project Fresh 3
Description Fresh 3 is the most recent collaboration between Pikcells and the world's largest manufacturer of wood panels, Kronospan. As part of Kronospan's annual series of Trends, Pikcells has been tasked with creating spaces and furniture to promote a variety of new materials sold by the company for the third Fresh product campaign.
Client Kronospan
Software used 3ds Max, V-Ray, After Effects, Photoshop

Contributors

Richard Benson Co-founder

Stephen Mooney Co-founder

Matt fell Studio manager

Ciprian Pal CGI supervisor

University of Huddersfield design graduates Richard Benson and Stephen Mooney initially formed Pikcells in 2003 to provide bespoke creative solutions to the architecture trade, but have since found themselves expanding into both the design and manufacturing industries. "Our team is young, creative and dynamic and most of us originated in either product design or architecture, which allows us to take on more design-led projects," says co-founder Richard Benson. "In the past we have designed buildings, interior room sets and even whole developments. We have always tried to fill the studio with people with creative bones and especially people from a design background. We feel this is very important when working in CGI as it enriches the decisions that an artist makes while creating work."

Pikcells' prominent focus on design has set the studio ahead of similar arch-vis and graphics agencies. "We are motivated by creating great images, not just great CGI," explains Benson. "A great image makes people first go 'Wow, that looks brilliant, what a cool idea', then they start to contemplate how it was made."

This has lead to one of the studio's most successful collaborations, working with the world's leading wood-panel manufacturer, Kronospan, on Fresh 3: an annual selection of products based around future architectural trends. "They are an incredibly forward-thinking company and allow us almost total creative freedom on these projects, which makes them some of the most satisfying jobs to work on," says Benson.

The Kronospan design team spent a year visiting various design shows to identify a handful of upcoming trends for the following year, before presenting them to Pikcells to create idyllic domestic scenarios. "This year's trends were Visionnaire, Industrialism, Sentiment and Bohemian Chic," Benson reveals. "They presented these to us in the form of some colours and some wood textures with a description of each. We then had to come up with spaces and furniture that reflect these trends. Typically you would have some inspiration and

> "I think most people would agree that if you are striving for photorealism, there are no shortcuts"
> **Richard Benson,** co-founder

Portfolio highlights

Pixcells' various commercial projects have included:

2012 For[u]m Augmented reality installation
2012 Fresh 3
2011 Fresh 2
2010 'Starplan Summer' advert – the studio's first TV ad project
2008 A major scheme requiring massive architectural design input in Longbridge
2007 A large mixed-use development design for Broadgate, Leeds

A With lighting being such a prominent aspect of the studio's work, Pikcells hired a photographer for six months to train the designers in the finer points of photography and how to better reflect the subtleties of lighting within their work

B "At the end of last year we erected a *Top Gear*-style Cool Board. We use this to keep track of emerging design trends that are big this year. This acts as a constant reminder for people in the office, as they walk past it they start to soak in these trends and new ideas," says Benson

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workspace

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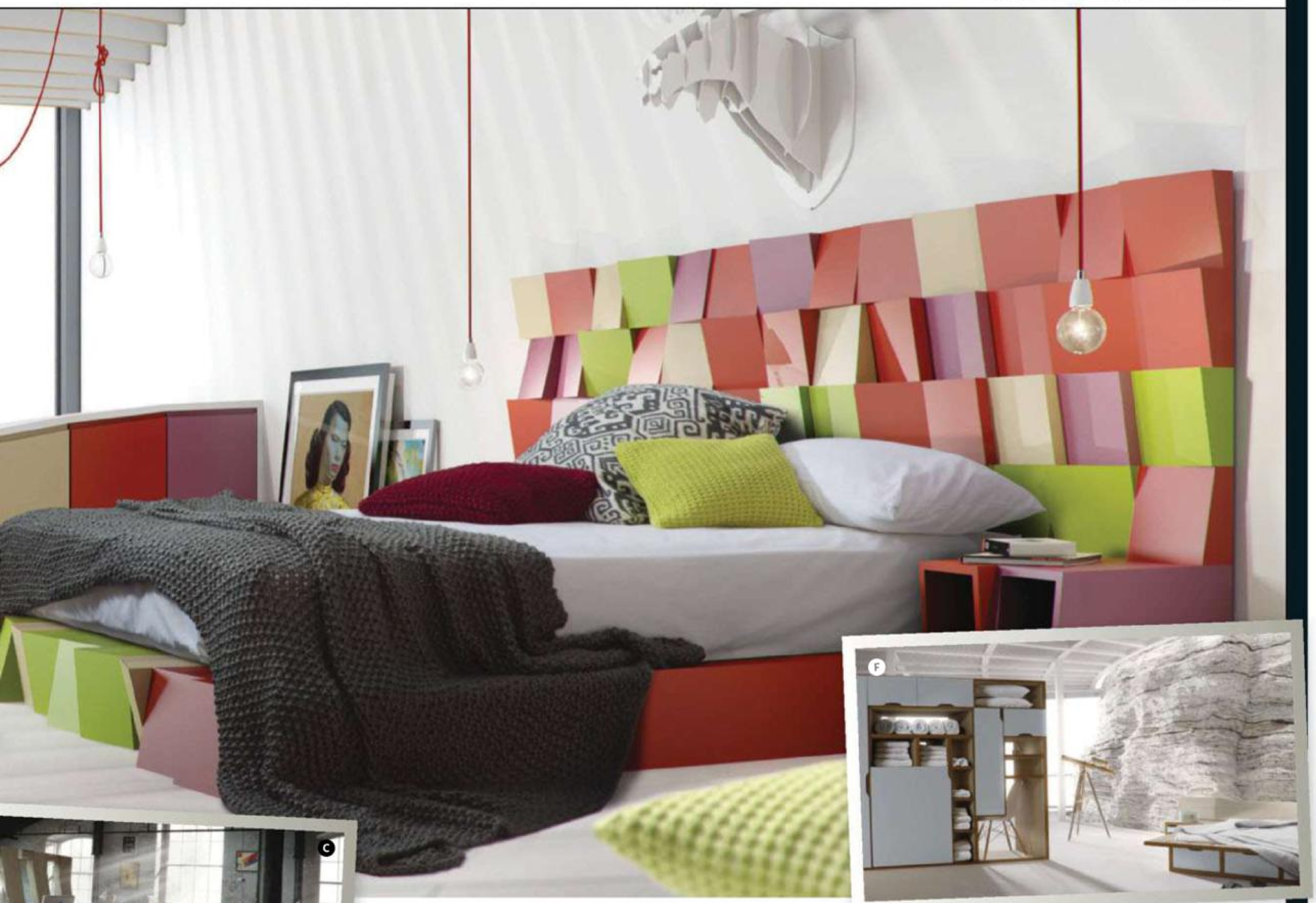

reference images, but for this we started out with a completely blank canvas; all we had were the briefs for each trend and this proved to be very difficult for a few of the sets. We had to create a space that conformed to the concepts outlined; for example, 'old but modern'.

"You have to just start creating formalist shapes and gradually build it up until you have some boundaries," continues Benson. "We try to pick up on emerging trends in fashion – as well as architecture and interior design – and use those as inspiration. There are a lot of geometric shapes and forms around this year and this theme was heavily incorporated throughout. It's easy to let your imagination run away with itself, so we have a rule about only creating things that could be built – this means thinking about how things would work and adding in relevant detailing to make it look realistic."

Benson insists that lighting is key to crafting a stunning photorealistic image, ultimately replicating the detail and immersion as a photographer would on a magazine shoot. "We developed custom IES profiles, which simulate the types of lights they use," he says. "Once you start lighting like a photographer, CGI becomes this whole new exciting thing again. VRaySun and Sky just don't cut it, as you can't get the results you want – you need to be able to control light and reflections to get them to do what you want. I think most people would agree that if you are striving for photorealism, there are no shortcuts."

C Benson reveals: "With a project like this it's easy to let your imagination run away, so we have a rule about only creating things that could be built. This means thinking about how this would work and adding in relevant detailing to make this look realistic"

D "Using CGI has only been possible for small businesses like us in the past five years," says Benson. "The photorealistic nature of our work allows us to compete directly with photography, which wouldn't have been economically viable when we started out"

E "This is the first time we have had to come up with spaces from absolutely nothing. Most of our projects involve some design work but this was the most challenging project so far in terms of creativity," Benson explains of Fresh 3

F Benson admits that competition is fierce in today's design industry. "If you want to be ahead of the curve it's not enough to just be able to create nice photomontages and quality, photorealistic images," he explains

Industry insider

Modern matte painting

Jaime Jasso, lead digital matte artist, ILM

Discover how a 100-year-old approach to special effects has evolved into one of the most demanding 3D disciplines in today's entertainment industry

About the insider

Job Lead digital matte artist, Industrial Light & Magic

Education Industrial Design University

Website www.jjassodigitalworks.com

Bio From a young age, Jasso was fascinated with cartoons and sci-fi – particularly *Star Wars*, which inspired his love for design, art and special effects. He grew up specialising in watercolours, oils, acrylics and traditional airbrushing, but it was *Jurassic Park* that convinced him to work in visual effects. Studying a variety of 3D programs saw him fall into matte painting – a profession that has taken him into some of the most impressive studios around the world.

You could arguably label matte painting as one of the earliest examples of filmmaking VFX, with Norman Dawn making the first use of it over a century ago in the 1907 movie *Missions Of California*. Over the following years it was used to expand such fantastical worlds as *The Wizard of Oz* and *Star Wars* – and even non-fantasy films like *Citizen Kane*. All the while the talented brushstrokes of skilled artists blurred the lines between reality and the viewers' imaginations.

"In the old-cinema era there were a lot of special effects cheats that could bring added value to the production," explains ILM lead digital matte artist Jaime Jasso. "One of them – matte painting – was the technique that enabled filmmakers to create any environment for visual effects, using any method: 3D, 2D, photomanipulation, practical models and so on."

Over the past 100 years of moviemaking, however, the discipline has been completely transformed. "Nowadays, 'matte painter' is the romantic label for what we've become, which is environment TDs and generalists," continues Jasso. "We no longer paint that much; everything is moving towards full-3D camera movies. So what do I do? I do concept art, 3D modelling, lighting and rendering, 2D painting, 3D projections and compositing. This is what a modern matte painter does for a living."

How have you seen matte painting evolve during the time you've been involved with the discipline?
When I started, the transition to the digital era was already complete. I never had a chance to do any traditional matte painting. However, even in the digital era I was witness to how this discipline has evolved from just using Photoshop to the need to learn a lot of other software. The process has become more technical now, but you never leave the artistic side behind, so it's a 50/50 use of your brain. You don't just take care of a beautiful and successful image; you are responsible for the efficiency in a digital, visual-effects production... You need to make your shots efficient, get your models and 3D to render faster and you need to know compositing as well in order to supply the compositor with enough proper elements for any purpose. Basically, you need to be a problem solver.

How much 3D work, such as modelling, is now involved in the matte-painting process?
I would say that 95 per cent of the work I do now is full 3D. This means that I have to model, texture, light and render the whole environment. Also, we do a lot of extra work, like rendering elements that can help your environment – maybe some flying vehicles, animated trees and foliage or some FX.

What tools and software do you make the most use of in your work?
I use Photoshop as my main matte-painting tool, 3ds Max for 3D and sometimes ZBrush if needed. I also use some other 3D packages like SpeedTree, Vue, NUKE or After Effects. I also use ILM's proprietary tools and whatever new stuff we can find – we're always taking a look and experimenting.

What advice would you give to others looking to work in matte painting? What are the key skills?
These days, when software makes things easier and faster and where you can easily find plenty of tutorials and resources, many people forget about what really makes an artist successful. The traditional skills are a must-learn.

You need to master the fundamentals of art, photography and traditional arts like drawing and painting. Software is just a tool, and in a production you will have to use your eyes in order to create, and your brain to solve artistic and technical problems.

Be humble, proactive, have passion for what you do and share your knowledge.

At the top of his game

Jasso reveals some of the most interesting and ambitious projects he's worked on so far

"*Avatar* was to me one of the most exciting projects I've ever worked on. The level of detail required for IMAX pushed me to the edge of my knowledge, and totally made a big improvement on my skills. *Transformers 3* was also great – we had the chance to build and create Cybertron from concepts to final renders, and this meant I had to learn new techniques and improve my 3D skills."

Portfolio highlights

Recent features that Jaime Jasso has worked on include:

2013 *Star Trek Into Darkness*
2012 *Cloud Atlas*
2012 *Marvel's The Avengers*
2012 *Battleship*
2011 *Red Tails*
2011 *Transformers 3*
2010 *Iron Man 2*
2009 *Avatar*
2009 *Star Wars: The Old Republic*

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> “Software is just a tool, and in a production you will have to use your eyes to create, and your brain to solve artistic and technical problems”

A Jasso started out in VFX with a book titled *3ds Max In 14 Days*. Apparently it took longer than a fortnight to make a decent demo reel!

B It was during the 90s that digital compositing began to seep into movie-making, going as far back as *Die Hard 2, released* in 1990

C Jasso's past in matte painting with oils, watercolours, acrylics, pencils and airbrushing have all been a huge boon to his career

D "It's amazing to have the most talented people in the world around you. This is the place that I've wanted to be at since I was a kid," Jasso says

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UNLEASH YOUR IMAGINATION

Bruce Heinlein

Q: Did you have any 3D software experience before coming to the DAVE School?
A: No, not at all. My background was mostly graphic design.

Q: How has your experience at the DAVE School been so far?
A: It has been great, I have learned so much in such a short period, it has also opened up a whole new level of possibilities for my creative side.

Q: Tell me about this Model?
A: This was created in less than a week. It was our second week project.

Q: Wow! Did you think that you would be able to create something like this in your second week of school?
A: Absolutely not! When the instructor showed us the reference material, my jaw dropped! I'm glad that I decided to come to the DAVE School, and look forward to what I can do next.

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